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**Empowering Women in STEM Leadership:
Overcoming Challenges in the Middle East and North Africa's Pharmaceutical Sector**

Accepted Manuscript

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**Empowering Women in STEM Leadership:
Overcoming Challenges in the Middle East and North
Africa's Pharmaceutical Sector**

Abstract

Background: Women's leadership in the Middle East and North Africa (MENA) region remains constrained by socio-cultural norms, institutional barriers, and organizational biases. While global research on gender and leadership is extensive, limited scholarship examines how these factors uniquely interact in MENA, particularly within the male-dominated pharmaceutical sector. Existing studies often focus on either macro-level policy changes or micro-level individual agency, without fully integrating both dimensions.

Purpose: This study investigates the barriers and enablers of women's leadership in the MENA pharmaceutical sector, examining how structural constraints, institutional support, and individual agency shape career trajectories. Using an intersectional sensibility, we showcase the lived experiences of women in science-driven corporate environments.

Design/methodology/approach: A qualitative, multi-case study approach was conducted through in-depth interviews with twenty-one female leaders in pharmaceutical organizations across MENA. Thematic analysis identified patterns in institutional policies, organizational culture, and leadership strategies.

Findings: While gender norms restrict women's leadership opportunities, emerging policy reforms, mentorship networks, and shifting organizational dynamics create pathways for inclusion. Successful women leaders leverage social capital, navigate patriarchal resistance, and utilize organizational support mechanisms.

Practical Implications: Findings inform pharmaceutical firms and policymakers on promoting inclusive leadership, revising institutional policies, and strengthening mentorship networks.

Social Implications: Highlighting successful strategies challenges restrictive norms and supports broader gender equity initiatives in MENA workplaces.

Originality: This study is the first to examine women's leadership in the MENA pharmaceutical sector, offering new contextually grounded empirical and conceptual contributions.

Keywords: MENA women, women in healthcare, MENA pharmaceutical industry, women in the pharmaceutical sector, gender equality.

Introduction

Despite advances in women's education and workforce participation, gender disparities in leadership persist globally, particularly in the Middle East and North Africa (MENA).² Women remain underrepresented in science-driven industries such as pharmaceuticals, where leadership is predominantly male. Although MENA produces a higher percentage of female science, technology, engineering, and mathematics (STEM) graduates than Europe or the U.S. (PwC, 2022), these educational gains have not translated into equitable career progression.

This leadership imbalance has significant implications: gender-diverse leadership enhances innovation, decision-making, and gender-sensitive healthcare strategies (Iyer, 2020; Fotheringham, 2021). While prior studies examine the challenges women encounter in the pharmaceutical field, few focus on corporate environments; an unconventional space for women in STEM (Adams-Harmon and Greer-Williams, 2021). Moreover, much research on women in STEM leadership is Western-centric. Given persistent systemic barriers in MENA that impede women's advancement (Madi *et al.*, 2023; Abalkhail, 2018), and responding to the paucity of research on women's career experiences in non-Western contexts (Al Marzouqi and Forster, 2011; Itani *et al.*, 2011; Tlaiss, 2013b; Patterson *et al.*, 2021) and calls for intersectional case studies (Tariq and Syed, 2018; Kele *et al.*, 2022), this research examines the challenges and opportunities faced by women navigating leadership in MENA's pharmaceutical sector.

Drawing on in-depth interviews with twenty-one female leaders, we explore the barriers, enablers, and adaptive strategies shaping their leadership trajectories. Applying an intersectional sensibility (Cho *et al.*, 2013), the study provides a nuanced understanding into the interplay of institutional, cultural, and personal factors influencing women's advancement. Findings offer practical recommendations for pharmaceutical firms and policymakers seeking to foster gender-equitable leadership pipelines, advancing Sustainable Development Goal (SDG) 5 and supporting UAE and Saudi Arabia Vision 2030 goals.

The paper begins with an overview of gender parity in MENA, followed by a review of existing literature on women's leadership in healthcare and STEM industries. By examining women's leadership in a largely underexplored MENA context, this study offers novel empirical and conceptual contributions to the literature. Subsequently, the research methodology is outlined, followed by an analysis of the key findings. The paper concludes with a discussion of implications, limitations, and directions for future research.

² MENA: Middle East and North Africa: 19 countries form the MENA region, according to the World Bank. These are: United Arab Emirates, Algeria, Bahrain, Djibouti, Egypt, Iran, Iraq, Jordan, Kuwait, Lebanon, Libya, Morocco, Oman, Qatar, Saudi Arabia, Syria, Tunisia, West Bank and Gaza, Yemen

The status of gender inequity across MENA

Despite the UAE's prominent position, many MENA countries rank among the lowest globally in gender parity (WEF, 2023; Lomazzi, 2020; Khannous, 2016). This disparity is particularly striking when considering the strong educational achievements of women across the region (Madi *et al.*, 2023; WEF, 2023; Khannous, 2016; PWC, 2022). Yet these advances are not reflected in women's economic participation (World Bank, 2024). MENA has the world's lowest female labor force participation rate (Khannous, 2016), with women representing only 19% of the workforce (World Bank, labor force female, 2024) and their leadership presence disproportionately low (ILOSTAT). For instance, women represented no more than 21.42% of corporate board members in Gulf Cooperation Council (GCC) countries between 2010 and 2018 (Jizi *et al.*, 2022). Persistent systemic barriers across MENA – including institutional biases, patriarchal corporate norms, and gendered leadership expectations – continue to hinder women's advancement (Madi *et al.*, 2023; Abalkhail, 2018).

As women face distinct gender expectations when navigating their career paths (Abalkhail, 2018), and while many MENA countries such as Jordan, Lebanon, and the Gulf countries have narrowed the gender gap in education (WEF, 2023; PwC, 2022), further research is needed to examine the career progression experiences of women as they pursue leadership roles, particularly in STEM (Patterson *et al.*, 2021). The pharmaceutical sector, where leadership influences research priorities, clinical trials, and treatment accessibility (Iyer, 2020; Fotheringham, 2021), presents a compelling case for exploring how women navigate and challenge structural constraints. The ensuing sections synthesize key empirical studies that examine women's entry, retention, and progression in STEM fields in MENA.

Career progression challenges for MENA women: STEM and healthcare leadership

The glass ceiling represents one of the most persistent barriers to women's advancement in professional and organizational hierarchies. As articulated by Chisholm-Burns *et al.* (2017), it represents an invisible yet powerful obstacle that restricts women's progression into senior leadership despite equivalent qualifications and achievements to men. Rather than explicit exclusion, it operates through subtle, systemic biases, stereotypes, and institutional practices that cumulatively hinder upward mobility. Women may reach mid-level positions but encounter a disproportionate drop in opportunities beyond that point. Cotter *et al.* (2001) similarly identify the glass ceiling as a distinctly gendered constraint operating at the upper end of the earnings and leadership hierarchy. However, scholars have argued that the metaphor no longer fully captures contemporary realities. Eagly and Carli (2007) contend that while overt exclusion has decreased, women now confront a series of complex, interlocking challenges throughout their careers rather than a single impenetrable barrier. They propose the "labyrinth" as a more

accurate metaphor: a winding, multifaceted path marked by uneven routes, detours, and structural obstacles that shape women's leadership journeys.

These patterns are evident in sectors where women constitute the workforce majority, such as healthcare and academia, demonstrating that representation does not guarantee leadership equity. Globally, women have received fewer than five percent of Nobel Prizes in STEM (Corson & Gonzalez-Morales, 2024), and in healthcare they remain 52% less likely than men to advance into senior management due to discrimination and work–family constraints (LaPierre & Zimmerman, 2012). Given the central role of STEM fields in economic transformation (Özdemir, 2023), understanding the structural barriers and enabling conditions shaping women's leadership trajectories is essential; particularly in underexamined contexts such as the MENA region, where this study offers novel and contextually grounded insight.

Gender disparities in STEM are particularly pronounced across the MENA region. Despite legislative reforms and the growing presence of Emirati women in professional and leadership roles (Al Marzouqi & Forster, 2011), women remain significantly underrepresented in STEM and healthcare leadership. A clear paradox persists: although women excel academically in these fields, they rarely advance into senior positions. In Oman, for example, women constitute 56% of STEM graduates but only 5.7% of healthcare management roles (Kemp & Madsen, 2014). Similarly, Kemp *et al.* (2021) found that despite a strong pipeline of female STEM graduates in the UAE, only two of twelve participants remained in STEM careers, reflecting broader attrition patterns.

This trend is echoed in healthcare leadership. Tlaiss (2015), in one of the few studies focused on MENA, found that traditional gender roles and societal norms in Lebanon created invisible ceilings that curtailed women's advancement. Even in pharmacy – a rapidly feminizing profession – leadership opportunities remain skewed toward men, with women disproportionately affected by work–life tensions, institutional bias, and limited mentorship (Mill *et al.*, 2023). These findings underscore the need for career advisors and HR managers to align STEM pathways with culturally relevant motivations, highlight successful female role models, and emphasize STEM's social impact to improve recruitment and retention (Kemp *et al.*, 2021). The persistence of gendered expectations across both STEM and healthcare indicates that early career attrition is systemic and cannot be addressed through individual resilience alone.

Comparable patterns appear in the UAE's computer science and information technology (CSIT) sector. Al Marzouqi and Forster (2011) identified gender discrimination and the demanding nature of CSIT work as key barriers to women's participation, while socio-cultural factors, particularly family influence, further limit women's entry and retention in such fields (Tlaiss, 2013b). Suggested strategies include enhancing school-level exposure to

science and CSIT, providing clearer pathways into these careers, and increasing private sector involvement to support women's participation (Al Marzouqi & Forster, 2011).

Socio-cultural norms and institutional barriers

The structural exclusion of women from leadership roles in STEM and healthcare is reinforced by deeply embedded socio-cultural norms in MENA workplaces. [These norms often derive from conservative religious interpretations, particularly in countries such as Saudi Arabia \(Madi et al., 2023\), where Shari'a law governs many aspects of public and private life, including marriage, divorce, custody, and inheritance \(Lomazzi, 2020\). While interpretations vary across Islamic traditions, resulting in different impacts on women, traditional readings have historically reinforced gendered roles grounded in notions of "natural" differences. In contrast, contemporary reformist scholars advocate reinterpretation and legal reform to align Islamic jurisprudence with principles of justice and gender equality \(Lomazzi, 2020\).](#) Despite recent legal reforms in the UAE (El-Ouahi & Larivière, 2023), sector-specific and region-specific barriers continue to impede women's leadership progression in STEM and healthcare. Al-Zaabi, Ramirez-Garcia, and Moyano (2021) found that Emirati women in engineering were often pressured to conform to male-dominated workplace cultures, encountering patriarchal norms, implicit bias, and exclusionary networks. Additional constraints emerge from socio-cultural practices linked to male guardianship, which restrict women's autonomy in professional and healthcare-related decision-making and exacerbate gendered disparities in well-being and access to care (Moussawi, 2023). These structural challenges are further documented in Patterson, Varadarajan, and Salim's (2021) meta-analysis of 88 studies on gender inequality in UAE workplaces, which, despite acknowledging incremental progress, highlights persistent socio-cultural barriers and critiques gender-neutral policy approaches. The authors call for context-specific, culturally aligned, evidence-based interventions to support genuine change (ibid.).

However, beyond the Middle East, global research echoes similar challenges. Chisholm-Burns *et al.*, (2017) identified comparable gender biases in healthcare leadership, where stereotypes and institutional structures continue to privilege male advancement. Kalaitzi *et al.* (2019), in Greece and Malta, likewise reported work–life conflict, limited support, gendered stereotypes, and restricted access to leadership training as major constraints. In the U.S. pharmaceutical industry, Adams-Harmon and Greer-Williams (2021) found that women leaders faced imposter feelings (Clance & Imes, 1978), peer jealousy, including from female colleagues, gender bias, and exclusionary managerial practices. These findings reveal that such barriers are global but become more pronounced in conservative socio-cultural environments such as MENA, where norms around modesty, family roles, and gendered expectations continue to shape women's workplace experiences (Tlaiss, 2013b).

As such, to develop a more nuanced understanding of career progression among MENA women in the pharmaceutical sector – an area where scholarship is limited – applying an intersectional lens proves invaluable. Originating in U.S. Black feminist theory (Crenshaw, 1991), intersectionality has gained prominence for its capacity to illuminate how multiple dimensions of inequality operate simultaneously (Cho *et al.*, 2013). It offers a critical framework for examining how socially constructed categories of difference interact with issues of power, social context, and systemic injustice (Crenshaw, 1991). Based upon this broader theoretical framing, here, we adopt an “intersectional sensibility” (Cho *et al.*, 2013, p. 795) – an awareness of the complex interrelation between identity and power – throughout our analysis. While an emerging body of scholarship explores the intersectional workplace experiences of minority-ethnic women in Western contexts (e.g., Tariq & Syed, 2018; Kele *et al.*, 2022), far less is known about how intersectionality can illuminate the career experiences of MENA women, whose trajectories are shaped by distinctive socio-cultural and institutional environments. We therefore pose the following research questions:

- 1) "What are the key individual, socio-cultural and institutional barriers that hinder women's progression to leadership roles in STEM and healthcare sectors in the MENA region?"
- 2) What culturally tailored interventions can support their advancement?

In answering these questions, we contribute to the scarcity of literature on female leaders in the pharmaceutical industry in non-western contexts (Al Marzouqi & Forster, 2011; Itani *et al.*, 2011; Tlaiss, 2013b; Patterson, Varadarajan, & Salim, 2021) and provide practical recommendations for pharmaceutical firms and policymakers to advance gender equity.

Methods

Overview of context

Given the limited scholarship on women in the pharma sector in the MENA region, it was essential to understand the unique socio-cultural context shaping their leadership aspirations. Qualitative research was therefore employed to explore participants' experiences in depth, accounting for contextual factors and multiple socially constructed realities (Saunders *et al.*, 2019; Cleland, 2015; Ritchie *et al.*, 2013). This approach aligns with our intersectional sensibility (Cho *et al.*, 2013) and is particularly important as female leaders navigate socio-cultural influences and career trajectories distinct from their male counterparts, which shape their perceptions and decisions (Saunders *et al.*, 2019; Ritchie *et al.*, 2013; Cleland, 2015). Furthermore, qualitative methods generate rich, nuanced data, enabling a comprehensive understanding of the phenomenon (Ritchie *et al.*, 2013; Hennink *et al.*, 2020; Marshall and Rossman, 2014).

Sampling and data collection

The first author's background in the MENA pharmaceutical sector was central to identifying participants willing to share their experiences. Raised in a conservative society in Lebanon, she has built a 17-year career in the pharmaceutical industry, rising to senior leadership roles. Now based in the UAE, she undertook this research to better understand the barriers faced by women with similar trajectories. Her identification with the study population created both advantages and challenges. It enabled easier recruitment and fostered trust and openness during interviews but also made it difficult to maintain complete neutrality. Participants sometimes sought her agreement or invited her to reflect on her own experiences, and although she occasionally resonated with their negative accounts, she worked to preserve neutral body language to avoid influencing responses. Participants also occasionally asked about her motivations for conducting the study. Overall, conversations flowed naturally, in part because she is a recognized colleague within the same industry context.

Heterogeneous sampling was used to explore cultural and societal differences in the MENA region and address ethnic diversity limitations in previous studies (Abalkhail, 2018). Initially, purposive sampling identified potential participants meeting specific criteria (Table 1), with the first author contacting female leaders via phone or LinkedIn. Due to non-responses, snowball sampling was also used, asking interviewees to nominate other female leaders, prioritizing those who added diversity to the sample (Adams-Harmon, and Greer-Williams, 2021). Additional recruitment via LinkedIn posts and direct contacts ultimately resulted in twelve diverse participants, achieving data saturation.

INSERT TABLE ONE APPROXIMATELY HERE

Semi-structured interviews were selected for their capacity to generate rich, nuanced data and explore meanings through flexible questioning and follow-up prompts (Saunders *et al.*, 2019). One-on-one interviews supported confidentiality and independent reflection (Rowley, 2012). The interview schedule included fifteen open-ended questions about participants' career journeys and personal experiences as female leaders. Most interviews were conducted virtually, with one held face-to-face. Virtual interviews offered a cost-effective method with broad geographic reach, and reliable platforms enabled the observation of non-verbal cues (Saunders *et al.*, 2019). All interviews were recorded with consent and began with introductory questions to build rapport. Participants reported feeling comfortable discussing their experiences because the interviewer, an Arab woman working in the same regional context and industry, understood the challenges they faced. This shared background also allowed some interviews to be conducted in participants' native languages (Arabic or French), which often better conveyed emotional nuance. To enhance credibility, the researcher used member checking during and after interviews, inviting participants to clarify or confirm the

meanings of their statements. This process strengthened interpretive accuracy, reduced misrepresentation, and increased the authenticity of the analysis.

The initial cohort of twelve female leaders facilitated an initial analysis and discussion of findings. Subsequently, we opted to expand the cohort to further validate the findings. The first author found recruitment easier after informing potential participants that twelve other female leaders were interviewed. This likely enhanced research credibility and encouraged additional participation. The final cohort consisted of twenty-one diverse female leaders, from across the MENA pharma industry. Participant information is detailed in Table 2.

INSERT TABLE TWO APPROXIMATELY HERE

Data analysis

Interview recordings were first transcribed using online voice-recognition software and then checked against the audio files, with attention to tone and relevant non-verbal cues. Transcripts were stored under coded identifiers on a password-protected computer. The analytic process followed the structured procedures of template analysis (King *et al.*, 2018). The first author read the transcripts multiple times to build familiarity with the data and refine early interpretations. An initial coding template was developed using both a priori concepts and inductive insights, applied systematically across transcripts, and iteratively revised as further data were analyzed. To enhance credibility, participants were invited to clarify and confirm interpretations of their responses during and after interviews, in line with standard member-checking practices. Applying an intersectional sensibility (Cho *et al.*, 2013) enabled a nuanced understanding of the lived experiences of participants and the structural inequalities shaping their leadership trajectories. The detailed portrayal of workplace cultures and national contexts provides thick description, supporting the transferability of findings to other MENA STEM or pharmaceutical settings. The final hierarchical template captured themes at personal, organizational, and socio-cultural levels.

Findings

Our findings demonstrate how individual agency intersects with the MENA pharmaceutical and healthcare context as well as with systemic, socio-cultural assumptions, uniquely shaping the experiences and leadership trajectories of our participants. In the following sections, we offer an in-depth discussion of the six key themes (Table 3), framed as barriers and enablers, on personal, organizational, and socio-cultural levels.

INSERT TABLE THREE APPROXIMATELY HERE

Multi-level barriers to career progression

Empirical findings revealed multiple layers of career barriers at individual, organizational, and societal levels. At the personal level, six participants acknowledged tendencies to question their own abilities. Notably, two referenced Hewlett Packard's internal report, which found that women often wait until they meet 100% of a job's requirements before applying, whereas men typically apply when meeting only 60% (Mohr, 2014). This inclination to underestimate one's capabilities aligns with the concept of imposter syndrome, which describes women's propensity to undervalue their skills (Clance & Imes, 1978). While multifaceted in origin, imposter syndrome is widely understood to extend beyond individual psychology, reflecting systemic bias and exclusionary practices within organizational and societal contexts (Tulshyan & Burey, 2021; Mullangi & Jagsi, 2019).

Our findings also underscore the influence of social and organizational dynamics within the MENA region. Participants frequently observed that men appear more confident in their abilities, a perception reinforced by senior leaders. One participant with over 14 years of regional pharmaceutical experience reflected:

"I feel as women in the Middle East, we have to deliver and to work 4-5 times more than our male peers, in order to prove that we are capable" (19V)

This aligns with prior work on socio-cultural barriers in the UAE IT sector, which highlights how traditional practices shape women's self-limiting behaviors and career trajectories (Al-Marzouqi & Forster, 2011). The tendency for women to hold themselves to higher standards than men is further noted in the literature across healthcare and organizational contexts (Chrisholm-Burns *et al.*, 2017); Adams-Harmon & Greer-Williams (2021).

At the organizational level, three main barriers emerged. The first concerns diversity, equity, and inclusion (DEI) initiatives. Sixteen participants acknowledged meaningful progress in women's representation within leadership; however, concerns arose regarding the narrow focus on measurable DEI outcomes, often at the expense of fostering a holistic culture of equity and inclusion. Four participants observed that while female representation in the MENA pharmaceutical industry has improved, women are frequently concentrated in functions such as Medical or Regulatory Affairs, which offer limited pathways to top leadership. In contrast, roles with greater financial responsibility and direct trajectories to senior leadership, such as Sales and Marketing, remain male-dominated. This pattern mirrors findings in healthcare, where women often occupy specialized roles with fewer advancement opportunities relative to men (Chrisholm-Burns *et al.*, (2017).

The second organizational barrier relates to perceptions of unconscious bias and stereotyping, reported by fourteen participants. Six described inappropriate questions during interviews, often regarding marriage or childbearing, reflecting a socio-cultural assumption

that women with family commitments are less productive. A senior UAE pharmaceutical leader with over 23 years of experience recalled:

“I was interviewed at one point by a manager asking me what are your plans? He went into a personal aspect and said, “are you planning to have babies”? So, you can imagine that he sees that this is a factor that can delay you from performing well in a company. Like if I'm taking a woman into my team, how can I ensure that she would be 100% performing, not dragged into pregnancy, not dragged into maternity leaves, and leaving the business? (17Q)

Another participant reported a supervisor undermining her authority, assuming she could not travel frequently due to family obligations. Five participants described male colleagues stereotyping them as overly emotional or lacking emotional intelligence. Additionally, one participant described how male colleagues made joking remarks about her budgeting skills, reflecting the stereotype that women are less competent in mathematics. One participant recounted being told that women must work twice as hard as men to achieve promotion.

Although the patriarchal context of the MENA region may amplify these organizational challenges, similar patterns exist elsewhere. LaPierre and Zimmerman (2012) found that women in the US healthcare sector reported obstacles in hiring and promotion due to gender biases, while Adams-Harmon and Greer-Williams (2021) highlighted comparable promotional disadvantages in the US pharmaceutical sector.

A recurring theme was the tendency to stereotype women as aggressive when exhibiting strong leadership traits. Six participants emphasized that men exhibiting similar behaviors are rarely penalized. One UAE pharmaceutical leader explained:

“My high profile gives people the feeling that I am aggressive. I don't feel that this feedback is fair ... If it were a man, he would never receive this feedback. I feel I receive this feedback because I'm a woman. My high profile is not matching with the expectation from women, it's normal for men to have a high profile but not women” (15O)

This stereotyping reflects entrenched organizational and socio-cultural expectations regarding gendered behaviors. Women are generally expected to display communal traits, such as sensitivity, warmth, and care, whereas agentic behaviors, such as assertiveness and decisiveness, are often perceived as incongruent with prescriptive gender norms (Vinkenburger *et al.*, 2011). Participants reported feeling the need to moderate their assertiveness to avoid negative perceptions, mirroring findings in Adams-Harmon and Greer-Williams (2021), where women struggled to balance being assertive, which could appear forceful, and agreeable, which might be interpreted as weak. One participant noted that her cheerful demeanor led colleagues to question her seriousness, illustrating the complex navigation of communal and agentic behaviors in leadership roles (Vinkenburger *et al.*, 2011).

The final category of barriers concerns socio-cultural challenges. Fourteen participants emphasized the expectation to conform to patriarchal gender norms prevalent in MENA culture (Madi *et al.*, 2023), which prioritize women's roles in marriage and household responsibilities over career ambitions (Lomazzi, 2020). Such norms can discourage women from pursuing demanding STEM careers, including in the pharmaceutical industry.

Partner support emerged as a critical dimension of these socio-cultural barriers. Seven participants described relationships in which partners were unsupportive of their career aspirations, generating significant stress and, in some cases, contributing to separation. One participant recounted:

"It would put a lot of challenge on our relationship when the job is demanding. Like you're working too many hours. Sometimes you're working after hours on weekends. You're not taking care of me. You have to wake up early for your job so you can't stay up at night and sit with me or go out with me at 11 p.m. or 12 a.m. Sometimes if I'm working from home and he would like, he wanted to leave during the day to his job, like I'm in a meeting and I don't have time to say goodbye. So this would make him really angry. So, he tried to show that he is supportive, but it was just in theory. In practice, no, he wasn't that supportive" (12L)

These findings align with Kalaitzi *et al.* (2019), who identified inadequate partner support as a major barrier to women's career progression in Greece and Malta, highlighting how patriarchal socio-cultural values shape both domestic and professional experiences that constrain women's career trajectories.

Multi-level enablers to career progression

Empirical findings identified career enablers at individual, organizational, and societal levels. At the individual level, the most salient enabler was self-advocacy and a commitment to learning, highlighted by nineteen participants. Dedication to personal growth and skill development was particularly evident in participants' motivation to pursue leadership roles that offered opportunities for development. One Lebanese pharmaceutical leader with nineteen years of experience reflected:

"Being someone ambitious and I always had this ambition to work on myself to develop myself and I knew that one day I would reach this position" (16P)

This aligns with Dweck's (2006) concept of a growth mindset, which may facilitate career progression. Further research is warranted to explore potential gendered differences in drivers of growth and ambition.

At the organizational level, coaching and mentorship emerged as critical enablers. All participants emphasized the substantial positive impact of mentorship on their careers. Sixteen participants identified male mentors as particularly influential, reflecting the predominance of men in MENA pharmaceutical leadership. Notably, participants derived different benefits from male and female mentorship. Five participants, with female mentors,

described receiving a great deal of support from them, as well as looking up to them, while participants with male mentors described male leaders as pushing them to step outside their comfort zone, and questioning their self-limiting beliefs. This is explained in the following excerpt from a female leader from Algeria:

“The men mentors, they teach you how to be bold .. They say why are you thinking this way? Why are you questioning yourself? And you learn how to be bold, how to not think twice sometimes” (1A)

These findings mirror LaPierre and Zimmerman (2012), who reported that women in the U.S. healthcare sector benefited more from male mentorship in terms of career advancement, while mentorship by women had less measurable impact. Indeed, mentoring has been widely recognized as a key factor in supporting women’s advancement to leadership roles in healthcare (Chrisholm-Burns *et al.*, 2017; Adams-Harmon and Greer-Williams, 2021).

Relatedly, participants emphasized the significance of fostering a holistic and inclusive work environment. This was characterized by integrating DEI principles into the organizational culture, implementing supportive policies such as flexible work arrangements, promoting community engagement through DEI-focused initiatives (e.g., employee resource groups and networking events), and addressing systemic barriers by ensuring adequate representation and inclusion of diverse backgrounds and perspectives. Given the underrepresentation of women in the MENA pharmaceutical industry, our research revealed a notable lack of well-established supportive networks. Despite participants representing twelve pharmaceutical companies, only two reported experiences of forums addressing women’s challenges. Supportive networks for women have been identified as critical drivers of advancement to leadership roles, as noted by Chrisholm-Burns *et al.*, (2017) and Adams-Harmon and Greer-Williams (2021). In particular, Adams-Harmon and Greer-Williams (2021) highlighted the positive impact of Healthcare Businesswomen’s Association (HBA) networking events, where participants reported tangible career benefits. Although HBA has recently established a UAE chapter, its regional presence remains limited, underscoring the importance of expanding and strengthening such initiatives to better support women’s career progression in MENA.

Finally, the positive influence of supportive socio-cultural environments emerged strongly in interviews with three participants who grew up in, or relocated to, more progressive environments within the UAE from traditionally conservative societies, such as Iraq and Tunisia. Of note was the transformative progress Saudi Arabia is making toward improving opportunities for women in the kingdom (Madi *et al.*, 2023). This was mentioned by a Saudi participant in our study:

“The opportunities are bigger because women have freedom .. Freedom to talk, freedom to work, freedom to travel, freedom to look, to dress the way they want” (5E)

Supportive environments also played a pivotal role within the home, with eight participants emphasizing their partner’s support as a crucial factor in advancing their careers. This support

was defined as the partner's recognition and respect for the woman's professional goals, coupled with their proactive involvement in household responsibilities. Notably, two participants shared experiences of transitioning from marriages where their aspirations were unsupported to unions with highly supportive partners. One such participant, a prominent leader in the UAE pharmaceutical industry with over 15 years of experience, encapsulated this perspective:

"I married twice actually, so I married the first one who was against women.. He was not at all supportive and he always made me feel under pressure that I should cook at this time, etc. And the children are also a priority for me, I am responsible for them, so I always felt guilty that I need to be focused on the children.. And then I married my current husband, he is very supportive" (12L)

Partners who shared domestic responsibilities challenged traditional patriarchal norms, easing the participants' household burdens and granting them greater capacity to focus on their careers. These egalitarian relationships were instrumental in empowering women to achieve professional success.

Lastly, a final critical factor in challenging patriarchal gender norms emerged from the influence of family values. Ten participants emphasized that values instilled during upbringing provided a foundation for career success and acted as a buffer against gendered societal expectations. By employing an intersectional sensibility (Cho *et al.*, 2013), findings highlight how family dynamics can simultaneously operate within and against broader structures of power, offering important, identity-rooted pathways for resisting systemic gender inequalities. This was noted in the following excerpt by a Lebanese participant, living in the UAE:

"Societal pressures didn't affect me because this was the effort done by my parents... The environment in the house was always around education and studies" (7G).

Notably, eight out of the ten participants, from diverse ethnic backgrounds specifically credited their fathers for playing a pivotal role in fostering these beliefs. This underscores the significant impact male figures can have in shaping and supporting a woman's career trajectory, further illustrating the importance of familial influence in dismantling traditional gender norms. A leader in the Saudi pharmaceutical industry illustrates this:

"So, my father, he's a person who champions independence of females. So, the culture of Saudi didn't affect us" (12L)

This finding presents a compelling and nuanced paradox: while the MENA region is often characterized by patriarchal structures that impede women's advancement, male allies can play a transformative role in enabling their leadership development. Within organizations, male mentors emerge as instrumental in addressing women's self-doubt, offering guidance, encouragement, and support that helps dismantle internalized barriers, such as imposter syndrome. Concurrently, in the socio-cultural sphere, supportive male figures, such as fathers and partners, foster ambition, resilience, and a sense of empowerment. These interconnected

influences demonstrate the unique and powerful potential of male allies, both in professional environments and personal relationships, to actively help women to navigate systemic challenges and transcend traditional gendered limitations, ultimately empowering them to achieve leadership roles. This finding represents a key contribution of this study to the existing literature, highlighting the need to rethink the narrative surrounding male participation in gender equity. By acknowledging the critical role of male allies in dismantling barriers to women's leadership attainment, the study emphasizes their transformative potential in driving meaningful progress toward gender equality in both organizational and socio-cultural contexts.

In sum, our findings reveal the complex, multi-layered interplay of individual, organizational, and socio-cultural barriers and enablers influencing women's leadership in the MENA pharmaceutical industry. This is illustrated in a visual thematic map (Figure 1). Findings illustrate how personal aspirations, institutional practices, and cultural factors intersect to shape career trajectories, highlighting the critical value of adopting an intersectional lens (Cho *et al.*, 2013) to understand and address the unique challenges faced by women in this context.

INSERT FIGURE ONE APPROXIMATELY HERE

Discussion

Despite notable advances in women's education and workforce participation, significant gender disparities in leadership persist globally, particularly in the MENA region, where women remain underrepresented in leadership roles, especially in STEM fields such as pharmaceuticals. To the best of our knowledge, this study is the first to explore the challenges and enablers encountered by Arab women in the MENA pharmaceutical industry, on their path to leadership. Responding to calls for research on non-Western contexts (Al Marzouqi and Forster, 2011; Itani *et al.*, 2011; Tlaiss, 2013b; Patterson *et al.*, 2021), and for further intersectional case studies (Tariq and Syed, 2018; Kele *et al.*, 2022), this study explored how persistent systemic barriers and unique socio-cultural contexts in the MENA region shape women's career trajectories (Madi *et al.*, 2023; Abalkhail, 2018), with a focus on the pharmaceutical sector.

Grounded in an intersectional framework (Cho *et al.*, 2013), empirical findings reveal a dynamic interplay between structural constraints, organizational support, and individual agency in women's progression to leadership. A key contribution lies in highlighting participants' exceptional ambition and commitment to learning, challenging entrenched assumptions that women inherently lack ambition (Sandberg, 2015), a notion increasingly discredited by contemporary evidence (PwC, 2022; Women in the Workplace, 2024). Despite their strong aspirations, many participants reported persistent self-doubt of their abilities, a core feature of imposter syndrome. Prior research indicates that 22% of women refrained from

applying for jobs due to fear of failure, compared to 13% of men (Mohr, 2014), suggesting that imposter syndrome is not merely an individual psychological phenomenon but deeply embedded within organizational and socio-cultural biases that differentially construct perceptions of competence along gendered lines.

Notably, our findings, informed by an intersectional sensibility (Cho *et al.*, 2013), reveal a powerful and paradoxical dynamic: in a region often characterized by patriarchal constraints, male figures – particularly fathers – emerged as critical enablers of women’s leadership. Participants frequently cited fathers who instilled ambition, resilience, and a drive for excellence, alongside mentors and partners who actively supported their career trajectories. This underscores a vital, yet often overlooked, dimension: men can act as essential allies in dismantling systemic barriers. Illuminating these positive male influences within a traditionally patriarchal context offers a novel contribution to the discourse on gender equity in MENA, reframing men not solely as gatekeepers but as pivotal actors in advancing women’s leadership and rights.

Our findings also carry important practical implications for individuals, organizations, and policymakers in the MENA pharmaceutical sector. Given the intersectional and culturally embedded barriers identified, effective interventions must operate across multiple levels. At the individual level, our findings underscore the need for culturally grounded confidence-building and ally-mentorship pathways that reflect how women’s self-efficacy is shaped by gender norms, family expectations, and organizational cultures. At the organizational level, the findings point to the importance of redesigning leadership pipelines to address gendered job segregation and implicit bias through inclusive rotational programs, transparent promotion criteria, and bias-aware managerial practices. At the societal and policy level, broader ecosystem support, through male allyship, family-responsive policies, and ongoing national reform initiatives, emerges as essential to women’s progression, reflecting the interdependence of family, organizational, and cultural forces. Collectively, these multi-level insights highlight that advancing women’s leadership in MENA pharma requires coordinated action that empowers individuals, transforms organizational systems, and aligns with evolving societal norms.

Conclusion

This study offers the first in-depth exploration of the intersecting challenges and enablers shaping Arab women’s leadership trajectories in the MENA pharmaceutical sector, providing empirical insight into a context that remains significantly understudied. Although snowball sampling and the first author’s positionality may have influenced the perspectives captured, the diversity of participants and the depth of narrative accounts provide a robust foundation for understanding these experiences. Future research should extend this work by

incorporating male allies' perspectives, testing these dynamics across other industries, and further examining how culturally specific norms shape gendered career pathways in non-Western settings.

Despite ongoing national reforms and growing corporate commitments to gender equity, this study reveals persistent structural and cultural barriers, including gendered job segregation, unconscious bias, and inconsistent organizational support, that continue to shape women's progression in the MENA pharmaceutical sector. Yet it also highlights powerful enablers, such as supportive allies, culturally grounded confidence-building, and evolving societal norms that are opening new possibilities for women's advancement.

Overall, the study underscores the need to move beyond compliance-driven DEI approaches toward genuine cultural transformation. By recognizing the lived realities of Arab women and designing interventions that address the intertwined individual, organizational, and societal forces that shape their careers, stakeholders can catalyze meaningful, region-specific progress. Advancing women's leadership in MENA science and healthcare is not only essential for achieving SDG 5 and aligning with national visions such as UAE and Saudi Vision 2030. It represents a strategic investment in the future of the region's knowledge economy. The momentum exists; the opportunity now is to translate it into sustained, systemic change.

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