Insight into the organizational culture and challenges faced by women STEM leaders in Africa

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Abstract

Compared to their men counterparts, women do not rapidly climb up the leadership ladder due to a glass ceiling obstacle. This study aims to explore the inhibiting factors demotivating Africa women's leadership pursuit in Science, Technology, Engineering, and Mathematics (STEM). A qualitative approach was adopted using online open-ended questions to seek narratives from African women leaders on their roles and experiences of a STEM career. Data were collected using a non-probability, purposive sample of African women leaders in STEM in African research institutes and universities. Forty-two women in leadership positions in 12 African countries participated in the study, which was content analyzed, seeking patterns and themes to explore the narratives. A common thread exists in the tone and life experiences of the African women leaders in STEM. Scholarship, supportive organizational structure, commitment, hard work, and tenacity were all experienced as enablers of the career path process and their attained positions. The education level contributed to a strong leadership position. Women experience less acceptance than males in STEM leadership as the organizational culture still devalues women in leadership positions in several African countries. The study's contribution, the limitations, recommendations, and managerial implications are discussed, with suggestions for further research are made.

Keywords: academic institution, career progression, gender imbalance, glass ceiling, professionals

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Introduction

The subject of gender bias, as seen nowadays within organizations and all over, muddles up the fairness in the craving of many women to become a leader in any society, be it to occupy leadership positions in higher education institutions in science, technology, engineering, and mathematics (STEM). Women scientists have a vital part in scientific leadership and in contributing to Africa's development and transformation. Still, they remain substantially underrepresented in higher education and STEM as only 30% of women in higher education move into STEM-related fields (UNESCO 2017). Being a woman brings the complexity of personality in the African context. There is no common African culture. Africa is culturally complex and fluid with diverse cultures, natural environments, and ways of living with various ethnic, socio-cultural, and historical norms, including how women behave (Lituchy, Galperin, and Punnett 2017, Mama and Okazawa-Rey 2012). Still, sub-Saharan Africa is generally known for its rich oral traditions and proverbs, which are the most widely and commonly used in this oral arts tradition (Boahene 2013, Benson 2003, Grant and Asimeng-Boahene 2006). However, there is a collective sense of belongingness among the individual regarding others (Lituchy, Galperin, and Punnett 2017, Poltera and Schreiner 2019). Careers in STEM fields, are widely acknowledged as central to the future; women, especially, black remain underrepresented in most of these fields (McGee and Bentley 2017). For instance, women are in a leadership position in only 12 of the 117 universities in the Southern African Development Community (Guramatunhu-Mudiwa 2010). In other words, Women's acceptance and involvement in science, technology, and development, especially in leadership positions, still leaves much to be desired. Therefore, this study seeks to explore the organizational culture and challenges Africa women in STEM leadership faced.

Research Questions

The study research questions are: what are African women's experiences regarding their leadership success and roles in STEM careers? Sub-research questions in this study were:

1. How do women face everyday challenges in their position as a leader in STEM?
2. What biases or stereotypes, if any, does she encountered in her STEM position as a leader
3. What experiences have altered or changed a woman in STEM as a leader?
4. What is the professional environment like for women in STEM?
5. How does organizational culture facilitate or hinder the leadership style of STEM women?

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Literature Review

One in every three researchers generally are women (Madry et al. 2017). This type of outcome might be due to the availability of opportunity, access to education, institutional leadership, and emotional intelligence in women in STEM leadership within Africa (Mayer, Oosthuizen, and Surtee 2017). Similarly, studies showed that men are three times more likely than women to hold leadership positions nor reach top-level research positions (Mekongo et al. 2019). Scholars call for women's inclusiveness in research to maximize innovation and equity and build gender gap (Mitchneck, Smith, and Latimer 2016, Moss-Racusin et al. 2016) to attract, retain, and build women's research capacity.

Furst and Reeves (2008) have contended that women's growth to leadership is attributable to the dealings of perceived individual disposition and the locus of control (Sharma and Tarp 2018). It illustrated three viewpoints on the effects of personal inclination and maleness or femaleness in the rise to leadership. Wille et al. (2018) showed that gender differences in leadership traits were not as evident among executives as observed among lower cadres. Moreover, leaders tend to differ from the led for both sexes on conscientiousness and extraversion. Possibly, the social-psychological understanding of how boys' and girls' socialization have different patterns impacts their ethical dispositions (Gottlieb, Grossman, and Robinson 2018). The disposition's hierarchical level dissimilarities were more evident among females than males (Wille et al. 2018). Through socialization processes, women internalize the expectation to care for others and protect society's most vulnerable members (Gottlieb, Grossman, and Robinson 2018).

Research findings of Dambrin and Lambert (2012) opined that misleading studies damage what women represent, pointing to havoc in biased stance. The contextual factors that tend to influence when women are likely to show forth as leaders depend on complicated interactions between individual gender, group gender composition, and group personality composition (Lemoine, Aggarwal, and Steed 2016). Lemoine, Aggarwal, and Steed (2016) study indicated that more men groups do not choose men as leaders. Women do not emerge as leaders in a group with more women, just as group extraversion alters leader emergence patterns in groups with more men (Lemoine, Aggarwal, and Steed 2016).

The 'queen bee' theory explains that women leaders' adaptation into male-dominated organizations by distancing themselves from junior women results from the unfair gender perception that women experience at work (Derks, Van Laar, and Ellemers 2016). The research further explains that queen bee behavior responds to the discrimination and social identity threat women may experience in male-dominated organizations. And that queen bee behavior

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is part of a general self-group distancing answer found in marginalized societies (Derks, Van Laar, and Ellemers 2016). Adaptive responses to challenge, once internalized, can become expressions of resilience. Resilience is defined as a set of inner resources, social competencies, and cultural strategies that permit individuals to survive, recover, or even thrive after stressful events and draw from the experience to enhance subsequent functioning (Stanton-Salazar and Spina 2000). Some identified factors contributing to resilience are high academic self-esteem (Cunningham and Swanson 2010), support structures (Williams and Portman 2014), knowledge of collective struggle against gender-related obstacles

O'Connor (1997), and the development of perseverance and optimism (Floyd 1996). The study indicated how resilience and stereotypes maintain high STEM achievement (Museus et al. 2011, McGee 2016).

Research on how the leaders' gender interacts with anger, sadness expression, and followers' attributions of emotional expression showed that people evaluate male and female leaders' competence differently depending on their emotional displays (anger vs. sadness) (Schaubroeck and Shao 2012). Sexual values may affect individuals' opinions and people's understanding; thus, shedding light on personality within cultural contexts (Ott-Holland et al. 2014). A multilevel investigation on the distinctive profile by Furr (2008) revealed that sexual values play a role in perceived self-other similarity. Hence, women and those from highly collectivistic cultures saw themselves as more like others. On the other hand, country-level analysis based on self-other similarity correlations within each country revealed that cultural assertiveness uniquely predicted this assumed similarity (Srivastava, Guglielmo, and Beer 2010). The outcomes elucidate people's personal views concerning others and add to personality within cultural settings.

With the influx of women into management, despite blockades, published works suggested that women leaders are confronted with questioning their expertise or performance (Ladegaard 2011), which applies to STEM leadership. However, the male leaders' authority in developing countries, such as in the Africa continent, is not subjected to questioning. A plethora of research on leadership behavior (Ladegaard 2011), but very few studies specifically address African women's leadership behavior within STEM in African countries. Women's career path barriers or successes in leadership within STEM in Africa showed paucity in published work. In many African countries, cultural traditions' barriers continue sternly to curtail women's rights (Ncube 2010), while some nations have substantial females as part of their board members. Yet, some have none (Chizema, Kamuriwo, and Shinozawa 2015).

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Women rising to top management positions are far beyond the unique challenges of being women in the workplace and include broader societal impacts. Global links, swelling social investment, and enhanced enthusiasm help, but not without public prejudices that weaken prospects for women leaders in STEM. Changes in the approach of how women view opportunities in the workplace and how policymakers and employers respond to the benefit of welcoming diversity more extensively were highlighted (McLaughlin et al. 2017) as Zimmerer and Yasin (1998) told, a need to explore the factors that influence women's career path success as STEM leaders. This study aims to articulate the problem faced by women STEM leaders. The objectives are to explore the common challenges, biases, or stereotypes faced by women STEM leaders and assess the organizational culture which facilitates or hinders women's leadership style in STEM.

Methods

Research Approach and Study Design

This study uses a qualitative approach to agree with research that stated that quantitative methods could not describe leadership roles and achievements (Avolio, Walumbwa, and Weber 2009, Parry et al. 2014). The exploratory study inquiry into women in STEM leadership showed the leaders' reflective meaning and experiences within a context through qualitative methods (Creswell 2009). The interpretivism was the theoretical perspective of the study because knowledge is relative in contextual meaning with self-reflexivity, culture, and time (Scotland 2009) due to its novelty on women leadership in Africa. The emerging patterns were considered and compared with theories that are already in existence (Creswell 2009). The study used a self-administered online semi-structured questionnaire with female STEM researchers from North Africa, West Africa, East Africa, and Southern Africa.

Population and Sampling

A total of 54 women from African countries were envisaged to be involved in the study. They were from four geographic zones of Africa: North, West, East, and South through purposive sampling of the women leadership in STEM. Participants were contacted by the link research scholars in the different institutions. In a few instances, a telephone call was made where there was no link person available. The unit of analysis of the sampled group consisted of all females who occupy leadership/senior management positions such as Director, Dean, and Principal Officer in STEM in the 54 African countries. It was not possible to access central Africa. Forty-two responses from 12 African countries were returned unspoiled. Excluded from

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the study were those working as part-time or visiting fellows, those who had less than two years of working experience in STEM, top managers with less than five years of working knowledge, and male employees.

Insert Figure 1

Data Collection

The participants received online questionnaires through email. The initial contact was through telephone calls and tête-à-tête discussion (during the researcher's visit to Kenya, Nigeria, Rwanda, and Sudan 2018). The survey, which was emailed to the participants, consisted of three sections; the declaration, demography, and open-ended questions. The declaration was the informed consent on top of the self-administered open-ended question questionnaire. The letter outlined information to be considered through the investigation period and included the protocol of North-West University, South Africa.

Data Analysis

The information gathered was in the form of transcripts by the participant, received as email attachments. The data analysis process involved reading, re-reading, assembling, and dissembling the written information. The narratives were thematically analyzed using the coding phases; the data were analyzed word-by-word and later line-by-line to create themes. The parallel themes and codes were interconnected to align with the research questions. Analysis of the organizational information data is essential to have a substantial understanding of the connections between the feedback obtained from the later phases' discussion (Pflanz 2011). It was content analyzed by organizing the written scripts into concepts by observing the commonality, peculiarity, and uniqueness in the narratives' responses. For the data's connection to show how one idea may impact another, data were deconstructed and finally put back together (reconstruct) in a more meaningful manner.

Trustworthiness and Ethical Considerations

To ensure the highest data quality, the researcher followed the analysis in a guided manner. The researcher is obliged to follow several ethical considerations during various phases of the project work. The NWU ethical committee provided ethical clearance, with all participants agreed to partake in the study.

Results

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Research question 1: How do women face everyday challenges in their position as a leader in STEM?

Most of the study participants mentioned (see Figure 2) gender discrimination as one of the main challenges that they face as leaders. They suggest, might affect their roles as leaders in their organizations. They highlighted that they face gender discrimination from males and females, which is supported by the extracts below:

> "Males say negative things about me sometimes, insubordination by some male counterparts under my leadership" (P1/Ghana/55-64)
>
> "Women who are negative towards other women and are talkative and will always talk behind your back to pull me down" (P9/South Africa/55-64)
>
> "Being underrated, looked down on and being side-lined when crucial/hard decisions are to be made because I am a female" (P21/Kenya/35-44)

However, some of the participants expressed that they face other challenges that are different from the above. A few of these difficulties being confronted by women holding leadership positions fail to unite the workforce as they come from different cultures and have diverse religious/spiritual backgrounds. Below is an extract that captures some of the challenges women face concerning culture and religion/spirituality. Apart from the above difficulties confronted by women, several of the participants indicated that time management, lack of cooperation from other workers, lack of backing from fellow women, and vague understanding of workers' vision and objectives are some of the challenges women in leadership face.

> "Lack of cooperation from colleagues is an issue especially when they want to underestimate my capability" (P20/Nigeria/35-44)
>
> "Have to rearrange the family demands with that of the job. I must work for long hours and travel quite often" (P3/South Africa/55-64)
>
> "I haven't personally experienced any hindrance at any organization where I held a leadership position. However, I have realized that other family roles can clash with management expectations, especially as a single parent. It is widespread where a woman in leadership should work long hours, be absent from home for a long period, and lack extended family support. Personally, the boarding school has been the best choice in making sure that I don't feel guilty of giving my childless attention" **(**P33/Lesotho/45-54).

Women in STEM generally face numerous challenges in an upward movement. Lack of cooperation from colleagues is an issue, especially when they want to underestimate one's

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capability, being underrated and looked down on, and being side-lined when crucial/hard decisions are made. Also, envy, conspiracy, and opposition from colleagues' especially senior ones, are serious challenges. Again, the "seeming" insubordination from older male subordinates is also a big problem, especially the challenge of some men wanting to intimidate women at the initial stage of headship. Indeed, male counterparts sometimes said negative things about women, while others show insubordination under women's leadership. One of the participants asserted:

> "Men do not regard me, and they see me as a threat, so I am always not flowing with them" (P23/Nigeria/55-64).

Women who are leaders also face the challenges of jealousy from colleagues, negative talkative women, intimidation from senior colleagues, and lack of support from other women in leadership. A woman said:

> "Getting people to understand one's vision and objectives of working in interdisciplinary research" (P8/Nigeria/45-54) was a challenge.

Furthermore, other challenges include combining the weights of family responsibilities with the demands of the official job, the problem of raising children while studying and working, and the fact that society does not recognize these contributions to keep our community sane. According to a participant:

> "I have to be at work for longer hours and to travel quite often. I do not have the same level ground to contest anything with my colleagues' opposite sex. I feel intimidated, then comes the need to have to combine family responsibilities with giving birth to children and house care" (P6/Nigeria/45-54), and another participant categorically emphasized family responsibility **(**P13/South Africa/45-54).
>
> "My main challenge is the balance between work, traveling and family care which is not always understood by all members of our senior staff" (P40/Cameroun/35-44)

In brief, women face contending with jealousy from various quarters, lack of sponsorship and empowerment, shortage of research equipment due to financial constraints, men getting higher salaries than women, whereas both are doing the same job. Working with lazy people, and time-wasters wanting to please the boss through insulting other members, lack of resources, people's unsatisfactory nature (especially women), lack of political will by policymakers to implement policies as the need be, ethnicity and religion, level of involvement in policy formulation in some organizations, lack of team spirit from the medical team and the introduction of new methodology in any field of knowledge.

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Finally, the following are assertions made by three participants concerning the challenges that they face in their positions as leaders. Firstly:

> "I was taught to see challenges as hurdles to be crossed to achieve goals. Therefore, I have always programmed myself to handle things as they come". The "challenges I had is common to any gender – but which I was always able to confront with the backing of the Dean and the support of the University, especially male colleagues, I found it very easy to confide in them than to women and of course prayer!" (P20/Nigeria/35-44).

Insert Figure 2

Research question 2: What biases or stereotypes, if any, does she encountered in her STEM position as a leader

Regarding the biases or stereotypes women faced in their leadership positions, most women intimated that they had encountered gender prejudice. The following extracts captured from some of the participants indicate it:

> "Voting for the positions of Dean first time. Some males refused to vote for me. Some were jealous of my rapid progress both at work and in the church" (P1/Ghana/55-64)

> "Man does not value decisions made by women especially if they are from the same race" (P2/Malawi/45-54)

> "They do not expect me (a woman) to know how to fix the network or work with technology. People equality believe that women positions should be below after men" (P12/South Africa/25-34)

> "Implicit bias related to gender and grade. Sometimes, people think that I am not qualified enough to be involved in a certain decision making" (P40/Cameroun/35-44)

The above attest to the widely available literature that women are not internationally recognized as leaders as society gives them the responsibility to keep the home. In contrast, men are responsible for providing stable finances for the family, which is indicated by some of the extracts captured below:

The cultural view of men in a society that women should not issue instructions to them

> "The biggest stereotype promoted by some women is that when a woman holds a managerial position, they should start behaving and acting like men. Women are

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made to act or toughen up and lose their womanliness. Women are emotional and sometimes make irrational decisions; women like fighting and gossiping." (P33/Lesotho/45-54)

Indeed, the biases or stereotypes women may have faced as a STEM leader may stem from men's cultural view in my society that women should not issue instructions to them. Another stereotype, especially by men, is that women are incapable and always require to be assisted. According to one participant:

"I relate to other people on an equal footing, and I have not experienced problems as a leader" (P6/Nigeria/45-54).

On the other hand, one of the participants said:

"Not much and probably because, in the institution that I work for, most of the leaders and bosses are ladies and so to have a lady leader is normal" (P28/Kenya/45-54).

Another participant wrote, "none" (P13/South Africa/45-54).

Research question 3: What experiences have altered or changed a woman in STEM as a leader? The researcher sought to find out what has transformed women in their roles as leaders. One of the participants said:

"I always think ahead and raise my head in the board room. The ability to analyze and process information proactively and thinking out of the box is also a new experience or a factor to consider. Add to these is the ability to incorporate more trans-disciplinary and inter-disciplinary research than pure and basic sciences, networking across the globe, working with people from different cultures, and appreciating different viewpoints. The above points are not only transformational but also bring people together" (P16/Kenya/55-64).

"I learned from short courses outside STEM that is incorporated into STEM research, to be strong and still be involved in everything I do. But being watchful of them not to destroy what other people who have gone higher, I learn from previous works as well as inputs and criticisms from others" (P10/Nigeria/55-64).

"The admiration I have for successful women in STEM over the world constitutes, for me, a source of motivation that makes me believe that I could do better to achieve my goal. I attended a workshop for women in science in 2015 in Trieste, where I met ladies who got the Elsevier prizes and suddenly decided to review my

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> position as a leader and doubled the effort to succeed, which allowed me to perform lots of things on the professional point of view since then" (P40/Cameroun/35-44)

The above points are not only transformational but also bring people together. However, some have also learned from encounters with women superiors with vindictive natures, while others said they must be neutral and not allow the personal feeling to show. Notable are the statements that good leadership and fairness provided by the current Executive Director, being focused, being determined to make it, being disciplined were some participant views. However, participants also stated that not everyone would support your drive for success, and not everyone wants you to succeed as a leader.

> "It should be noted that in our deeper most selves, we are all the same! We have the same fears, the same challenges, the difference being how one faces those fears and how one tackles those challenges, dealing with people with different characteristics" (P27/South Africa/65-74).

Furthermore, one of the participants reported that as a school Coordinator, she was faced with the challenge of facing up to male colleagues when she insisted that some students who cheated during the Industrial Training Scheme must repeat the academic year. Since it was an issue based on integrity and principle, she emphasized that these students' groups must happen. Her male colleagues expected her to give in, but after explaining her intentions to them, they supported her, and this singular act earned her their respect. However, she learned to improve while believing in herself from those mistakes. Another person said that when she successfully defended her master's thesis and passed, she realized that she was capable and just as competent as any other person, including men. Through a different experience, she delivered on the assigned tasks on time and in the right way, which her seniors appreciate.

One of the participants said:

> "knowing that being a leader, I understood that I must be a driving force and must carry everybody along (selflessly). Having been allowed to lead and to attain academic development, which has equipped me to perform maximally in my field." (P30/Nigeria/35-44).

Besides, collaboration, external communications, the experience of being responsible, and knowing that it is not always right to push responsibility onto another person. The mind-set of whatever is worth doing is worth doing well, not giving excuses to shun away from responsibilities. Dealing with non-cooperative individuals were responses obtained from some of the participants. However, since working with young people can be challenging, one of the participants said she has been accepted and encouraged, learned to be patient, and at the same

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time firm. In summary, the women revealed that being empathetic, having determination, being visionary, having discipline, self-belief, patience, being humble, respectful, authoritative, supportive, and loving have helped them be good leaders.

Research question 4: What is the professional environment like for women in STEM?

The participants expressed different opinions and feelings regarding the professional environment they are currently working in as women in leadership positions. To start with, one woman said that now, because of the high position she held, her colleagues show her a lot of respect. They also need her services, particularly with Ph.D. supervision, so she is often involved in providing advice to most Ph.D. students and reviewing scientific papers for publications. Another person said there is an understanding that men and women have equal abilities, and sometimes women can do better than men. She finds quite a few women in the professional environment, which she finds quite welcoming and conducive, even though some harsh environments. Her professional background is friendly now because of her senior colleagues' support, making it habitable. It is conducive even though it is rugged, rough, tough, challenging, ugly, and it is an environment for hard-work and multitasking. An academic setting is very accommodative compared to a private sector environment where dog eats dog—also, the supporting structures (available or provided for growth) help.

By contrast, responses that indicated that the professional environment is not favorable to women do not consider women's peculiarities and the enormity of their responsibility and professional excellence requirements. It's truly a man's world! This environment is discriminatory as men cannot accept women in leadership, probably because most members are male. Perhaps, because a high percentage of men are resistant to women attaining leadership positions, women are often relegated as not too high achievers. Nonetheless, such an environment may not be conducive to facilities and equipment. Consequently, individuals' true potential is never truly tapped due to perennial problems of lack of essential laboratory equipment and reagents, leading to frustration in research.

> "Talking about the professional environment in terms of collaboration, I would say it is friendly, and the networking is opened. But I am always in trouble due to the lack of facilities when considering my project or research. (P40/Cameroun/35-44).
>
> "Collaborative/collective responsibility" (P48/Uganda/35-44)
>
> "I am working/studying in a quite nice environment where I, as a woman, have value and voice when needed. However, sometimes a job is not assigned to you

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mainly because you are a woman. It is funny, but there are always lots of gossiping around when a woman achieves something, but I don't care about it" (P47/Cameroun/25-35).

Additionally, STEM's professional environment sometimes appears naturally challenging, tedious, and not easily accessible, and there can be sexual assaults. So, it requires courage and extra effort to breakthrough. Possibly, this may be why women are scarce in STEM because of their natural limitations.

Research question 5: How does organizational culture facilitate or hinder the leadership style of STEM women?

The participants expressed divided feelings and opinions regarding the influence of corporate culture on the direction. The following themes emerged from the participants:

"rituals, routines, control systems, and stories. A woman from Ghana related her experience that Ghana's laws promote females' use on all boards. As a scientist, I am overwhelmed by the call to serve on so many committees needing a scientist. Too many offers that I cannot meet all of them facilitate -- the organization provides mentoring courses" (P1/Ghana/55-64)

Furthermore, others believed that they prefer to be more flexible and not have too much red tape. The organizational culture facilitated their leadership because it believed in its philosophy. In addition to this, the corporate culture encourages one to bring out the best in its staff. Sometimes the organizational structure treats everyone as a man; women cannot occupy some positions while some are meant for women because they are women. Others believed that it helps them a lot, and their organization culture facilitates leadership because it is a woman leader in charge of a few men under her command.

Conversely, some do not depend on the organizational culture since it does not facilitate or hinder their leadership. Therefore, such women feel unstoppable no matter what structure is in operation. Furthermore, although male dominance may block leadership roles, and sometimes opportunities are not equally shared, one must press forward, not minding what happens. Precisely, in a university system, things are quite organized and move in their regular order. Once you do not see yourself as a woman, but as someone who has a responsibility to fulfill, nothing can hinder you. Also, one's capability and pedigree will always facilitate one's growth. For instance, academic credentials have a higher say in determining whether you could be a leader in the organization or not. One of the participants reported as follows:

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"My organization does not hinder leadership, but support staff in a leadership position, and because of the culture of my colleagues at work, the framework of the organizational culture does not discriminate against women leaders. On the contrary, it encourages female participation in leadership roles. Most of the discrimination stems from individual perception" (P35/Sudan/55-64)

"Sometimes decision making is not easy because of bureaucratic procedures" (P48/Uganda/35-44)

"Academic credentials have a higher say in determining whether you could be a leader in the organization or not. Therefore, I have could look out and create my own space of influence out of the organization. In Kenya, for instance, there is affirmative action to ensure that there is equal opportunity for each gender in leadership positions. Thus, ensuring that more women are now given leadership positions and has allowed me to prove that they are capable of delivering on my mandate" (P26/Kenya/35-44).

"The organizational culture facilitates my integration in my institution and allows me to be more confident by being friendlier and understanding" (P40/Cameroun/35-44)

A South Africa participant said:

"Being born and grow-up in Soweto, where the community is mixed (all cultures included). And that freedom of knowing that we are all human beings first before you are a Zulu, Xhosa, or any tribe helped break cultural barriers. I speak most South African languages, including Afrikaans, which is a strength in my leadership. Besides, the institution facilitates administration in that from the topmost bosses is a woman, and most Departments have a woman leader or boss encouraging our growth as women leaders. It facilitates when the organization is supportive and hinders when some unpalatable bottlenecks are brought into play that may slow down the work pace. Thus, the organization believes that whatever a man can do, a woman can do much better. So, that has allowed women to be in a critical position in the system" (P27/South Africa/65-74).

Contrary to the above, some extracts indicate;

"Male dominance hinders leadership. Sometimes men do not give me equal opportunities as men, but still, I press forward, not minding what happens. Sometimes they deny me some rights, but I was hesitant and not discouraged. I keep

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466 moving forward. Men are preferred because of the culture of the people I work
467 with" (P23/Nigeria/55-64).
468

469 **Discussion**

470 Resource distribution disparity incentivizes men and women differentially (Ronay,
471 Maddux, and Von Hippel 2020). Though the present study's goal is not to focus on the
472 differences in the gender of leadership, it may be interesting to know that men differ from
473 women in a leadership role. The phenomenon called queen bee is a state in which women are
474 leaders in organizations controlled by males and infuse themselves into the male world by
475 distancing themselves from female juniors, thus encouraging gender inequality. Derks, Van
476 Laar, and Ellemers (2016) agreed with the participants' responses that some challenges women
477 leaders face are non-cooperation from older women. Besides, it was reported that
478 insubordination is more associated with women's leadership than males (Vial, Napier, and
479 Brescoll 2016). As suggested in this study, women's leadership elicits less respect, making it
480 harder for them in a leadership role. Insubordination from junior colleagues worsens the
481 leadership hassle for women in leadership and could lead to anger and inappropriate
482 subordinates' responses.

483 Wrong perceptions of women's leadership were noted as a lack of support from
484 women's groups, the distance between women leaders and followers, and gender mechanism
485 (Gouws 2008). Some of these were expressed by participants as hindrances in women's
486 leadership in STEM. A female leader's positive gender identity reduces identity conflict in
487 women's leadership roles, consequently reducing stress and increasing life satisfaction
488 (Karelaia and Guillén 2014). They also found that positive leader identity increased women's
489 willingness to lead, also increased identity conflict. Some participants listed some negative
490 gender identity, which made their career and leadership very hectic. For example, black women
491 are generally negatively evaluated for their organizational failure over black men or white
492 women, and all are assessed negatively over white men in corporate failure. In terms of
493 organizational success, all categories are evaluated equally. The assertion is that there should
494 never be a failure for a black woman in leadership (Rosette et al. 2016). No participant
495 mentioned any loss story, but she saw challenges as hurdles to achieve goals. So, she has
496 conditioned herself to handle problems as they come.

497 Concerning challenges women face in leadership, Eagly and Heilman (2016) and noted
498 that discrimination resulting from cultural orientations relegates women's behavioral attributes,

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making this a serious challenge. It was reported from this research. Some women also shared their disrespect from subordinates and even those in higher offices because they are women. Besides, Meister, Sinclair, and Jehn (2017) researched how women navigate misinterpreted actions and found that women leaders become less salient with time and power.

Individuals exposed to female college or female-female mentoring experience less automatic stereotype behavior than those who went to mixed schools or were mentored by males (Dasgupta and Stout 2014). It supports this research because some participants said they never experienced automatic stereotype behavior because their institution had mostly female leaders and bosses. Some researchers ascribed leadership success to gender roles in society (Johnson et al. 2008). because female leaders' success depends on being sensitive, while males only require strength to achieve success. This claim confirms one participant's response that her inability to become the Dean of Faculty was because the male folk refused to vote for her. After all, she would not have enough strength, while others attribute slowness to women. Some participants pointed out that they were emancipated from men's cultural views concerning women's inability in leadership through leadership qualities they exhibited. Some men believe that women are incapable of leadership. Leadership abilities, women, can surmount these problems. Accordingly, it is necessary to have women in a leadership role to enhance prosperous and civil society (Hoyt and Murphy 2016). They also stated that the effects of stereotype threats on women depend on their ability to develop leadership qualities.

Stereotypes of emotion present two navigations that women should handle concerning (Brescoll 2016). The researcher also promulgated that a significant barrier for women leaders ascending and succeeding in leadership is the gender stereotype of emotion. The stereotype of emotion could be bad where anger and pride are displayed as a means of ascendancy, but even insensitive women may also fail to fulfill their warmth role as women. The participants noted some stereotype behaviors that could lead to anger or expression of negative emotion, which, if not guided, could result in leadership failure. Tiessen (2008) found that it's not enough for women to get into leadership. Still, their continued sustenance in male-dominated institutions is always a threat due to the gender unfriendly work environment, among other risks. It agrees with the participants' submission that having one's contribution valued by men is a problem.

Findings from the research on gender equality by the South African Commission reported that more than 30% of people who participated responded that women's emotional traits could not afford them to handle high-level positions (Gouws 2008). Usually, a narrow-minded ideology would support women's capacities to perform well in leadership positions. Nonetheless, the study participants' responses showed that women could not cope with a high-

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level leadership job. It is erroneous because the participants in this are leaders in different fields and have shown a lot of competence.

Audenaert et al. (2018) noted that challenges bring more satisfaction to an employee who agrees with the participants' submission. The same author also pointed out that employees expected contribution to the leader is a significant factor in job satisfaction. On the part of the employee, when the employee's expected contribution aligns with the leader's desired outcome, there is job satisfaction. Rus, Van Knippenberg, and Wisse (2010) subscribed that accountability is a factor affecting self-serving in leadership, while it does not strongly affect low power leaders.

Some participants mentioned that support from senior colleagues made the working environment habitable and friendly. In contrast, others said the situation is not favorable to women because it does not cognizance women's peculiarities, including their enormous tasks at home (Audenaert et al. 2018). Amidst women in STEM (Szelényi, Denson, and Inkelas 2013), women's interaction among diverse peers, especially at the tertiary institutions, facilitated enlargement of professional outcomes expectations. These common professional issues include anticipation to secure a noble job, accomplish a successful career, and combine a professional career and possess a balanced personal life. In another study, Stout et al. (2011), agreed with this research finding that women's exposure to female STEM professionals promotes a positive influence on their identification with STEM. Women developed their self-concept better with female professionals.

The effects of a welcoming academic environment on science identification of women were earlier researched (Ramsey, Betz, and Sekaquaptewa 2013). They realized that in welcoming educational settings, students had more information about STEM women and could better identify peer role models in STEM than in traditional academic environments. Interventions and exposure are potent tools in informing and retaining women in STEM. The analyzed experience of women in different stages of growing up and its effect on STEM choice by Dasgupta and Stout (2014) showed the recruitment, retaining, and advancement of girls and women in STEM. And that environment that is professional and conducive to learning and fosters belonging is far more likely to be successful, which aligns with some of the participants that their working environment is part of their encouragement. In another study, Gorman et al. (2010) equally concurred with the above by saying that local and national STEM outreach programs strengthened the STEM workforce and education pipelines at many points.

The role of STEM in economic and social development (Burke and Mattis 2007) was observed remarkably and was given positive affirmation. Chronic stress results from

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discrimination, stereotypical behaviors, and marriage/work interphase (Nelson and Quick 1985). It was observed that women who should compete with a work setting dominated by men suffer chronic pressure. Nelson and Quick (1985) summarized that the development of supportive and enduring mentor relationships and functioning enhances her self-awareness and self-boldness. The professional woman can efficiently manage pressure, and hence other women can learn from such a constructive role model. Besides, King and Ferguson (2001) emphasized the role of self-knowledge and mentoring as tools in the communal building up of women, common to this study's findings.

Leaders with relationship-oriented personalities affect their followers better in a supportive organization (Phaneuf et al. 2016). Leaders with a determined attitude to support and cooperate are most likely to engage their followers better. In keeping with this study, as mentioned by the participants, flexibility, and not much red tape showed good leadership. Thus, indicating that they undertake relational leadership which is cooperative. Similarly, developing contextual, powerful, and collective leadership dimensions is essential for leadership when discussing race and ethnicity (Ospina and Foldy 2009). As Vial, Napier, and Brescoll (2016) reported, females find it harder to elicit respect and admiration from subordinates and male colleagues. The participants also noted that male dominance hinders leadership, and sometimes women don't have equal opportunities with men.

Ways in which academics should assist in supporting the retention of females after their university education was proposed by Palumbo (2016), which is aligned with the findings of this research that men are preferentially treated with employment. Palumbo (2016) proposition will help bridge the gap in women's leadership and enhance women to grow into leadership in STEM or their chosen career. Women in Agriculture in Southeast Asia appear to have an equal share of land, capital, and other assets (Akter et al. 2017), contrary to some African nations' typical findings. The participants noted that even jobs are unequally shared between genders.

Since economics and leadership are connected, these researchers suggested that economics be integrated into leadership research (Zehnder, Herz, and Bonardi 2017). The women leaders, in their responses, supported accountability as a tool for ineffective leadership. Accountability should also inculcate economies of money used during the process of leadership. Moreover, another study by Parker (1996) found that African Americans and other women of race/color have fewer representative candidates in administration, which should serve as the possible potential for leadership experiences and motivate leadership positions. In their review, differences in race and gender usually influence the strategies of leadership. Establishments that have excellent worker relationships display substantially higher ranks of

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601 establishment value than ones whose workers show rapport that is poor (Lee and Kim 2016).
602 In agreement with the findings of this research, a good relationship is a key to good leadership.

603 **Limitations, Recommendations, and Managerial Implications**

604 The study was conducted without input from international research institutions in
605 Africa, which appoint women STEM leaders who could have provided additional data. It was
606 a challenge to get people to participate, most probably due to research fatigue and fear of being
607 identified if they mentioned negative experiences resulting from the institution. It is suggested
608 that more research is done on leadership and socio-cultural barriers to help African women in
609 STEM be rightfully prepare for leadership. Managers and organizations related to STEM in
610 Africa should consider women's peculiarities and the enormity of their responsibilities
611 regarding equity in professional excellence. Making working hours flexible, especially for
612 young mothers and single parents, and providing support at work in the form of playschools,
613 can also assist. There should always be a follow up on how well a leader is performing, and the
614 organization should not be too inflexible, as management does not equal managerialism.
615 Women should feel unstoppable, no matter what organizational structure and culture are
616 practiced. Communication and discussions on challenges preventing women from taking on
617 and exercise their leadership role in STEM should be encouraged in STEM organizations.

618 **Conclusions**

619 The study gave adequate information on the context, research sample, the data
620 collection and analysis method, and the researcher's ethical considerations. Thus, making it
621 vital for the provision of proper guidelines considered in the study. The current study concludes
622 that the way up is crooked and stressful for women leaders in STEM. Simultaneously, women's
623 leadership journey has been made possible through self-determination, mentors, partners' and
624 family members' support. In sum, similar challenges are experienced by African women leaders
625 in STEM across sampled African countries. African women leaders' experience provided
626 insights into the disposition of women's leadership within the context of STEM in Africa.
627 The study further showed that STEM women leaders face enormous challenges ranging
628 from discrimination, family demands, insubordination, ability underestimated, lack of
629 cooperation, and culturally specific issues. STEM leadership experiences revolve around skills,
630 boldness, and is above standards. These women's values and strategies often manifest in a
631 desire to grow, hard worker, self-actualization, sharing responsibilities, staying focused,
632 driving state-of-the-art research, upholding integrity, and maintaining financial accountability.
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Competing Interests

Authors declare no competing interests

Authors' contributions

OOB generated all data in the manuscript, administered the questionnaire, analyzed the data, and drafted the work. YdP commented on the script for intellectual content. SSB critically reviewed the manuscript and revised it. All the authors gave final approval for the version to be published.

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References

Akter, Sonia, Pieter Rutsaert, Joyce Luis, Nyo Me Htwe, Su Su San, Budi Raharjo, and Arlyna Pustika. 2017. "Women's empowerment and gender equity in agriculture: A different perspective from Southeast Asia." *Food Policy* 69:270-279. doi: 10.1016/j.foodpol.2017.05.003.

Audenaert, Mieke, Philippe Carette, Lynn M. Shore, Thomas Lange, Thomas Van Waeyenberg, and Adelien Decramer. 2018. "Leader-employee congruence of expected contributions in the employee-organization relationship." *The Leadership Quarterly* 29 (3):414-422. doi: 10.1016/j.leaqua.2017.09.003.

Avolio, Bruce J., Fred O. Walumbwa, and Todd J. Weber. 2009. "Leadership: Current Theories, Research, and Future Directions." *Annual Review of Psychology* 60 (1):421-449. doi: 10.1146/annurev.psych.60.110707.163621.

Benson, LouAnn 2003. "Circle of healing: Traditional storytelling, part one." *Arctic Anthropology* 40 (2):9-13.

Boahene, Lewis Asimeng 2013. "The social construction of sub-Saharan women's status through African proverbs." *Mediterranean Journal of Social Sciences* 4 (1):123-123.

Brescoll, Victoria L. 2016. "Leading with their hearts? How gender stereotypes of emotion lead to biased evaluations of female leaders." *The Leadership Quarterly* 27 (3):415-428. doi: 10.1016/j.leaqua.2016.02.005.

Burke, R. J., and M. C. (Eds.). Mattis. 2007. "Women and minorities in science, technology, engineering, and mathematics: Upping the numbers. Edward Elgar Publishing. ." doi: 10.1016/j.leaqua.2016.02.005.

Chizema, Amon, Dzidziso S Kamuriwo, and Yoshikatsu Shinozawa. 2015. "Women on corporate boards around the world: Triggers and barriers." *The Leadership Quarterly* 26 (6):1051-1065.

Creswell, John W. 2009. "Editorial: Mapping the Field of Mixed Methods Research." *Journal of Mixed Methods Research* 3 (2):95-108. doi: 10.1177/1558689808330883.

Cunningham, Michael, and Dena Phillips Swanson. 2010. "Educational resilience in African American adolescents." *The Journal of Negro Education* 79 (4):473-487.

Dambrin, Claire, and Caroline Lambert. 2012. "Who is she and who are we? A reflexive journey in research into the rarity of women in the highest ranks of accountancy." *Critical Perspectives on Accounting* 23 (1):1-16.

Dasgupta, Nilanjana, and Jane G. Stout. 2014. "Girls and Women in Science, Technology, Engineering, and Mathematics." *Policy Insights from the Behavioral and Brain Sciences* 1 (1):21-29. doi: 10.1177/2372732214549471.

Derks, Belle, Colette Van Laar, and Naomi Ellemers. 2016. "The queen bee phenomenon: Why women leaders distance themselves from junior women." *The Leadership Quarterly* 27 (3):456-469.

Eagly, A H, and M E Heilman. 2016. "Gender and leadership: Introduction to the special issue [Editorial]." *Leadership Quarterly* 27 (3):349-353. doi: 10.1016/j.obhdp.2014.08.002.

Floyd, Caren 1996. "Achieving despite the odds: A study of resilience among a group of Africa American high school seniors." *Journal of Negro Education* 65 (2):181-189.

Furr, R Michael 2008. "A framework for profile similarity: Integrating similarity, normativeness, and distinctiveness." *Journal of Personality* 76 (5):1267-1316.

Furst, Stacie A, and Martha Reeves. 2008. "Queens of the hill: Creative destruction and the emergence of executive leadership of women." *The Leadership Quarterly* 19 (3):372-384.

Gorman, S. T, M. C Durmowicz, E. M Roskes, and S. P Slattery. 2010. " Women in the academy: Female leadership in STEM education and the evolution of a mentoring

web. Forum on Public Policy " *Journal of the Oxford Roundtable,* 2:1-21. doi: 10.1007/s11218-013-9218-6.

Gottlieb, Jessica, Guy Grossman, and Amanda Lea Robinson. 2018. "Do men and women have different policy preferences in Africa? Determinants and implications of gender gaps in policy prioritization." *British Journal of Political Science* 48 (3):611-636.

Gouws, Amanda. 2008. "Obstacles for Women in Leadership Positions: The Case of South Africa." *Signs: Journal of Women in Culture and Society* 34 (1):21-27. doi: 10.1086/588486.

Grant, Rachel A, and Lewis Asimeng-Boahene. 2006. "Culturally responsive pedagogy in citizenship education: Using African proverbs as tools for teaching in urban schools." *Multicultural Perspectives* 8 (4):17-24.

Guramatunhu-Mudiwa, Precious. 2010. "Addressing the Issue of Gender Equity in the Presidency of the University System in the Southern African Development Community (SADC) Region." Forum on Public Policy Online.

Hoyt, Crystal L., and Susan E. Murphy. 2016. "Managing to clear the air: Stereotype threat, women, and leadership." *The Leadership Quarterly* 27 (3):387-399. doi: 10.1016/j.leaqua.2015.11.002.

Johnson, Stefanie K., Susan Elaine Murphy, Selamawit Zewdie, and Rebecca J. Reichard. 2008. "The strong, sensitive type: Effects of gender stereotypes and leadership prototypes on the evaluation of male and female leaders." *Organizational Behavior and Human Decision Processes* 106 (1):39-60. doi: 10.1016/j.obhdp.2007.12.002.

Karelaia, Natalia, and Laura Guillén. 2014. "Me, a woman and a leader: Positive social identity and identity conflict." *Organizational Behavior and Human Decision Processes* 125 (2):204-219. doi: 10.1016/j.obhdp.2014.08.002.

King, Toni C, and S Alease Ferguson. 2001. "Charting ourselves: Leadership development with Black professional women." *NWSA Journal* 13 (2):123-141.

Ladegaard, Hans J 2011. "Stereotypes and the discursive accomplishment of intergroup differentiation: Talking about 'the other'in a global business organization." *Pragmatics* 21 (1):85-109.

Lee, Jaeho, and Hakkon Kim. 2016. "Do employee relation responsibility and culture matter for firm value? International evidence." *Pacific-Basin Finance Journal* 40:191-209. doi: 10.1016/j.pacfin.2016.10.006.

Lemoine, G James, Ishani Aggarwal, and Laurens Bujold Steed. 2016. "When women emerge as leaders: Effects of extraversion and gender composition in groups." *The Leadership Quarterly* 27 (3):470-486.

Lituchy, Terri R, Bella L Galperin, and Betty Jane Punnett. 2017. *LEAD: Leadership effectiveness in Africa and the African diaspora pp 1-270*: Springer.

Madry, Aleksander, Aleksandar Makelov, Ludwig Schmidt, Dimitris Tsipras, and Adrian Vladu. 2017. "Towards deep learning models resistant to adversarial attacks." *arXiv preprint arXiv:.06083*

Mama, Amina, and Margo Okazawa-Rey. 2012. "Militarism, conflict and women's activism in the global era: Challenges and prospects for women in three West African contexts." *Feminist Review* 101 (1):97-123.

Mayer, Claude-Hélène, Rudolf M Oosthuizen, and Sabie Surtee. 2017. "Emotional intelligence in South African women leaders in higher education." *SA Journal of Industrial Psychology* 43 (1):1-12.

McGee, Ebony O, and Lydia Bentley. 2017. "The troubled success of Black women in STEM." *Cognition Instruction* 35 (4):265-289.

767 McGee, Ebony Omotola 2016. "Devalued Black and Latino racial identities: A byproduct of
768 college STEM success." *American Educational Research Journal* 53 (6):1626-1662.
769 McLaughlin, Hazel, Jo Silvester, Diana Bilimoria, Sophie Jané, Ruth Sealy, Kim Peters, H
770 Möltner, Morten Huse, and J Goke. 2017. "Women in power: Contributing factors
771 that impact on women in organizations and politics; psychological research and bets
772 practice." *Organizational Dynamics* 47 (3):189-199.
773 Meister, Alyson, Amanda Sinclair, and Karen A. Jehn. 2017. "Identities under scrutiny: How
774 women leaders navigate feeling misidentified at work." *The Leadership Quarterly* 28
775 (5):672-690. doi: 10.1016/j.leaqua.2017.01.009.
776 Mekongo, Pierrette Essama, Sylvie Kwedi Nolna, Marceline Djuidje Ngounoue, Judith
777 Torimiro Ndongo, Mireille Ndje Ndje, Celine Nkenfou Nguefeu, Julienne Nguefack,
778 Evelyn Mah, Amani Adjidja, and Barbara Atogho Tiedeu. 2019. "The Mentor–
779 Protégé Program in health research in Cameroon." *The Lancet* 393 (10171):e12-e13.
780 Mitchneck, B, J L Smith, and M Latimer. 2016. "A recipe for change: Creating a more
781 inclusive academy." *Science* 352 (6282):148-149
782
783 Moss-Racusin, Corinne A, Jojanneke van der Toorn, John F Dovidio, Victoria L Brescoll,
784 Mark J Graham, and Jo Handelsman. 2016. "A "scientific diversity" intervention to
785 reduce gender bias in a sample of life scientists." *CBE—Life Sciences Education* 15
786 (3):ar29.
787 Museus, Samuel D, Robert T Palmer, Ryan J Davis, and Dina Maramba. 2011. *Racial and
788 Ethnic Minority Student Success in STEM Education: ASHE Higher Education
789 Report, Volume 36, Number 6*: John Wiley & Sons.
790 Ncube, Lisa B 2010. "Ubuntu: A transformative leadership philosophy." *Journal of
791 Leadership Studies* 4 (3):77-82.
792 Nelson, D. L, and J. C Quick. 1985. "Professional women: Are distress and disease
793 inevitable? ." *Academy of Management Review, 10(2), 206-218.* 10 (2):206-218. doi:
794 10.1016/j.leaqua.2016.02.005.
795 O'Connor, Carla 1997. "Dispositions toward (collective) struggle and educational resilience
796 in the inner city: A case analysis of six African-American high school students."
797 *American Educational Research Journal* 34 (4):593-629.
798 Ospina, Sonia, and Erica Foldy. 2009. "A critical review of race and ethnicity in the
799 leadership literature: Surfacing context, power and the collective dimensions of
800 leadership." *The Leadership Quarterly* 20 (6):876-896. doi:
801 10.1016/j.leaqua.2009.09.005.
802 Ott-Holland, Catherine J, Jason L Huang, Ann Marie Ryan, Fabian Elizondo, and Patrick L
803 Wadlington. 2014. "The effects of culture and gender on perceived self-other
804 similarity in personality." *Journal of Research in Personality* 53:13-21.
805 Palumbo, Laura. 2016. "Championing Institutional Goals: Academic Libraries Supporting
806 Graduate Women in STEM." *The Journal of Academic Librarianship* 42 (3):192-199.
807 doi: 10.1016/j.acalib.2016.03.003.
808 Parker, Patricia S. 1996. "Gender, culture, and leadership: Toward a culturally distinct model
809 of African-American women executives' leadership strategies." *The Leadership
810 Quarterly* 7 (2):189-214. doi: 10.1016/s1048-9843(96)90040-5.
811 Parry, Ken, Michael D. Mumford, Ian Bower, and Logan L. Watts. 2014. "Qualitative and
812 historiometric methods in leadership research: A review of the first 25years of The
813 Leadership Quarterly." *The Leadership Quarterly* 25 (1):132-151. doi:
814 10.1016/j.leaqua.2013.11.006.

Pflanz, M. . 2011. "Women in positions of influence: Exploring the journeys of female community leaders. http://digitalcommons.unl.edu/cehsedaddiss. Accessed 29th August 2019.". doi: 10.1016/j.leaqua.2013.11.006.

Phaneuf, Julie-Élaine, Jean-Sébastien Boudrias, Vincent Rousseau, and Éric Brunelle. 2016. "Personality and transformational leadership: The moderating effect of organizational context." *Personality and Individual Differences* 102:30-35. doi: 10.1016/j.paid.2016.06.052.

Poltera, Jacqui, and Jenny Schreiner. 2019. "Problematising women's leadership in the African context." *Agenda* 33 (1):9-20.

Ramsey, Laura R., Diana E. Betz, and Denise Sekaquaptewa. 2013. "The effects of an academic environment intervention on science identification among women in STEM." *Social Psychology of Education* 16 (3):377-397. doi: 10.1007/s11218-013-9218-6.

Ronay, Richard, William W. Maddux, and William Von Hippel. 2020. "Inequality rules: Resource distribution and the evolution of dominance- and prestige-based leadership." *The Leadership Quarterly* 31 (2):101246. doi: 10.1016/j.leaqua.2018.04.004.

Rosette, Ashleigh Shelby, Christy Zhou Koval, Anyi Ma, and Robert Livingston. 2016. "Race matters for women leaders: Intersectional effects on agentic deficiencies and penalties." *The Leadership Quarterly* 27 (3):429-445. doi: 10.1016/j.leaqua.2016.01.008.

Rus, Diana, Daan Van Knippenberg, and Barbara Wisse. 2010. "Leader power and leader self-serving behavior: The role of effective leadership beliefs and performance information." *Journal of Experimental Social Psychology* 46 (6):922-933. doi: 10.1016/j.jesp.2010.06.007.

Schaubroeck, John M, and Ping Shao. 2012. "The role of attribution in how followers respond to the emotional expression of male and female leaders." *The Leadership Quarterly* 23 (1):27-42.

Scotland, J. 2009. "Exploring the philosophical underpinnings of research: Relating ontology and epistemology to the methodology and methods of the scientific, interpretive, and critical research paradigms." *English Language Teaching* 5 (9):9-16. doi: 10.1177/1558689808330883.

Sharma, Smriti, and Finn Tarp. 2018. "Does managerial personality matter? Evidence from firms in Vietnam." *Journal of Economic and Behavior Organization* 150:432-445.

Srivastava, Sanjay, Steve Guglielmo, and Jennifer S Beer. 2010. "Perceiving others' personalities: Examining the dimensionality, assumed similarity to the self, and stability of perceiver effects." *Journal of Personality and Social Psychology* 98 (3):520.

Stanton-Salazar, Ricardo D, and Stephanie Urso Spina. 2000. "The network orientations of highly resilient urban minority youth: A network-analytic account of minority socialization and its educational implications." *The Urban Review* 32 (3):227-261.

Stout, Jane G. , Nilanjana Dasgupta, Matthew Hunsinger, and Melissa A. McManus. 2011. "STEMing the tide: Using ingroup experts to inoculate women's self-concept in science, technology, engineering, and mathematics (STEM)." *Journal of Personality and Social Psychology* 100 (2):255–270. doi: 10.1177/2372732214549471.

Szelényi, Katalin, Nida Denson, and Karen Kurotsuchi Inkelas. 2013. "Women in STEM Majors and Professional Outcome Expectations: The Role of Living-Learning Programs and Other College Environments." *Research in Higher Education* 54 (8):851-873. doi: 10.1007/s11162-013-9299-2.

Tiessen, Rebecca. 2008. "Small Victories But Slow Progress." *International Feminist Journal of Politics* 10 (2):198-215. doi: 10.1080/14616740801957547.

UNESCO. 2017. "Women in science factsheet. Institute for Statistics. http://uis.unesco.org/ sites/default/files/documents/fs43-women-in-science-2017-en.pdf. ." doi: 10.1016/j.pacfin.2016.10.006.

Vial, Andrea C., Jaime L. Napier, and Victoria L. Brescoll. 2016. "A bed of thorns: Female leaders and the self-reinforcing cycle of illegitimacy." *The Leadership Quarterly* 27 (3):400-414. doi: 10.1016/j.leaqua.2015.12.004.

Wille, Bart, Brenton M Wiernik, Jasmine Vergauwe, Amelie Vrijdags, and Nikola Trbovic. 2018. "Personality characteristics of male and female executives: Distinct pathways to success?" *Journal of Vocational Behavior* 106:220-235.

Williams, Joseph M, and Tarrell Awe Agahe Portman. 2014. "“No one ever asked me”: Urban African American students' perceptions of educational resilience." *Journal of Multicultural Counseling and Development* 42 (1):13-30.

Zehnder, Christian, Holger Herz, and Jean-Philippe Bonardi. 2017. "A productive clash of cultures: Injecting economics into leadership research." *The Leadership Quarterly* 28 (1):65-85. doi: 10.1016/j.leaqua.2016.10.004.

Zimmerer, Thomas W, and Mahmoud M Yasin. 1998. "A leadership profile of American project managers." *Project Management Journal* 29 (1):31-38.

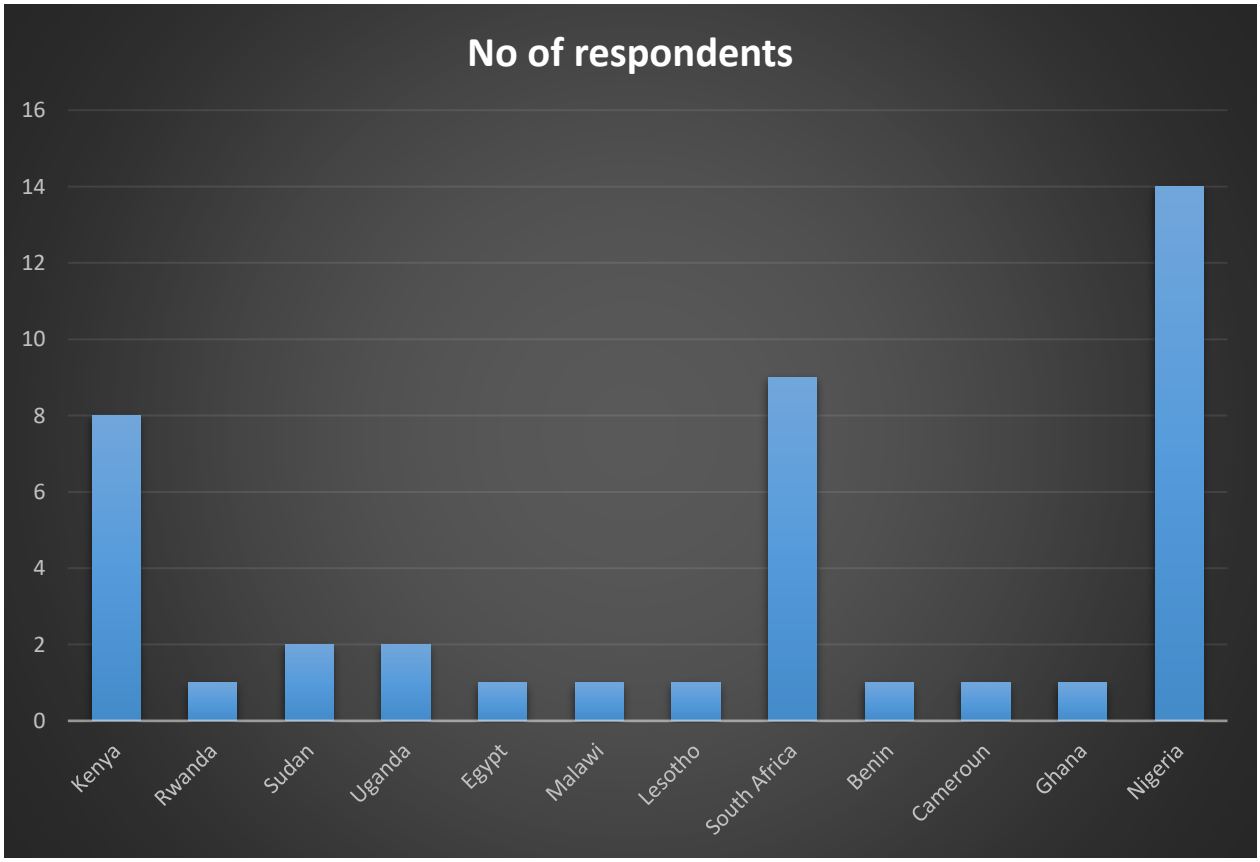

Figure 1: No of Participants from 12 African Countries

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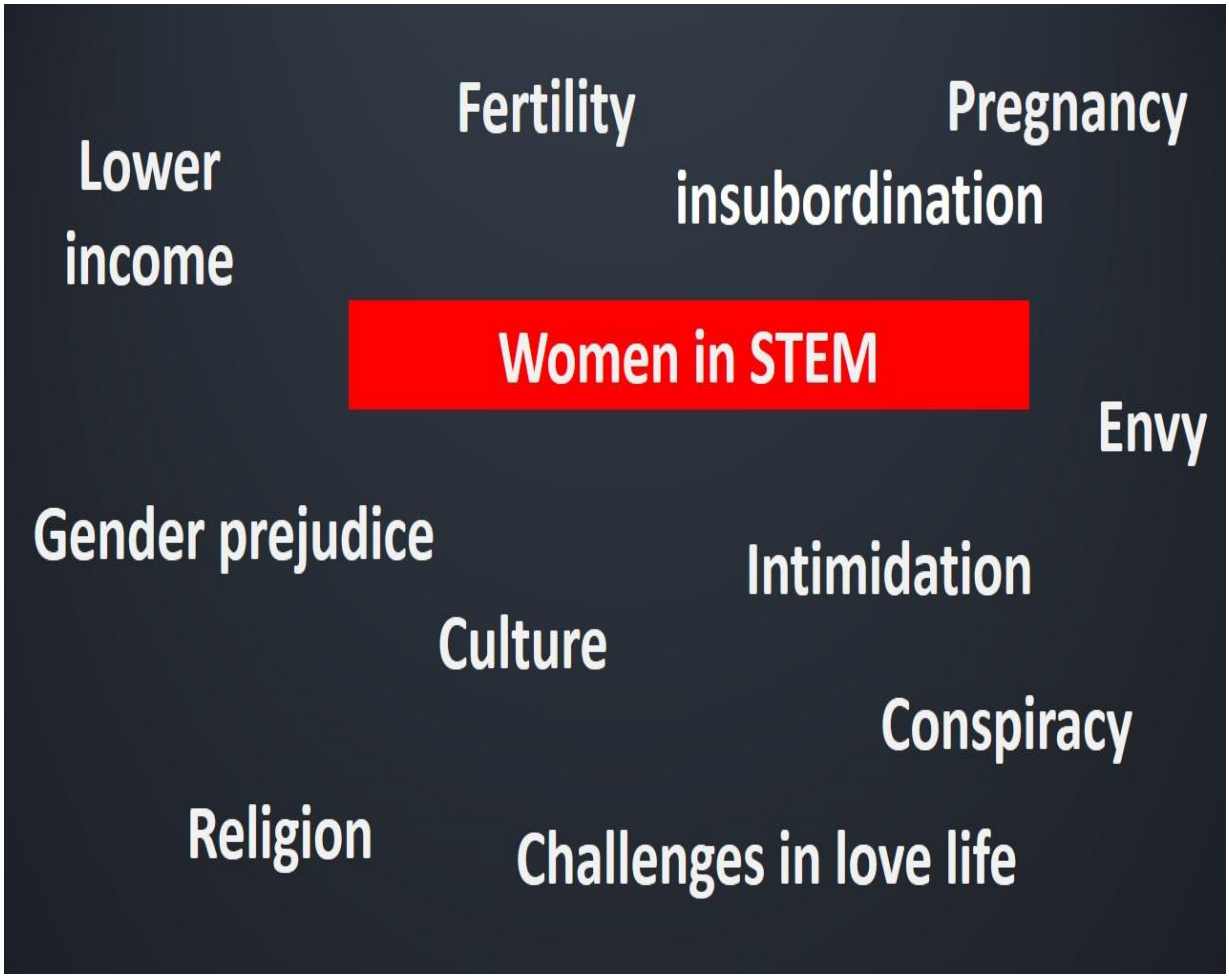

Figure 2: Challenges faced by Women leaders in STEM