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INSIGHTS INTO GENDER DYNAMICS IN NIGERIAN PROFESSIONAL ENGINEERING ECOSYSTEM: FINDINGS OF APWEN/PEIS GENDER AUDIT AND POLICY ON CAREER PROGRESSION

Felicia Nnenna Agubata [1], Osazoduwa Osasieme Agboneni [2] and Robinson Ichakpa Ejilah [3,*]

[1] Department of Terrestrial Services, Nigerian Airspace Management Agency, Murtala Muhammed International Airport, Ikeja, Lagos, Nigeria.
[2]. Department of Research &; Development, Nenis Engineering Co. Ltd, # 143 Obafemi Awolowo Road, Ota-Ona, Ikorodu, Lagos, Nigeria. 104101.
[3] Department of Mechanical/Production Engineering, Abubakar Tafawa Balewa University, Bauchi, Nigeria.
* Corresponding Author

ORCID Details
Agboneni O.O: https://orcid.org/0000-0002-5390-0251
Ejilah I. R.: https://orcid.org/0000-0002-6941-3570

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ABSTRACT

This study investigated the integration of gender equality and inclusion within Nigeria's engineering field, concentrating on key organizations like the NSE, PEIs, COREN, and APWEN. Utilizing document reviews, surveys, and interviews, data were collected from members and staff across the country. An analysis of policies, programs, and HR practices revealed significant shortcomings in gender sensitivity, understanding, and disability access. Notably, female engineers reported discrimination, harassment, and work-life balance struggles, while many institutions lacked strong gender equality policies. Accessibility barriers for persons with disabilities were also common. The study underscored the systemic nature of these issues and their impact on inclusivity. It concluded that substantial interventions are necessary to foster a more equitable engineering sector. Recommendations included developing comprehensive gender policies, promoting gender awareness training, implementing affirmative action, improving disability access, supporting women's career growth, cultivating inclusive leadership, and addressing work-life balance. These measures are essential for achieving a truly inclusive engineering environment in Nigeria.

Keywords: Gender mainstreaming, Inclusion, Engineering sector, Nigeria, Disability access, Gender equality policies.

1 INTRODUCTION

Systemic barriers, including discriminatory laws, cultural biases, and unequal access to resources and education, have historically limited women's leadership opportunities globally [1,2,3,4]. This persistent issue is particularly evident in Nigeria, where significant gender inequality, especially in political representation, hinders the effective addressing of gender-specific concerns [5,6,7,8]. The Nigerian Society of Engineers (NSE) aspires to be a globally recognized

engineering organization that develops its members' skills, supports national progress, and drives technological innovation, with 25 divisions like APWEN is also focused on promoting women in engineering and encouraging girls in STEM [9,10]. While, the Council for the Regulation of Engineering in Nigeria (COREN) is a government-established body responsible for overseeing and regulating all aspects of engineering practice across the country [11]. These organizations play very crucial roles in this gender audit. Within the NSE, a stark gender gap exists, with only 6.59% female membership in 2018 [12]. To counter this underrepresentation, which impedes societal development, the adoption of global best practices, aligned with the UN Inter-Agency Standing Committee's (IASC) mandate for gender equality and women's empowerment, is essential, directly supporting Sustainable Development Goals 5 and 10 [13,14]. While educational access for women has improved, barriers to tertiary STEM education, fueled by stereotypes and discrimination, persist. This disparity mirrors the global trend of female underrepresentation in engineering, exacerbated in Nigeria by cultural norms, limited support, and gender-based discrimination. Hostile work environments and pay gaps further contribute to female engineers' attrition, hindering gender diversity in organizations [15,16,17].

Achieving substantive female representation in decision-making is crucial for rectifying these inequalities. Policy interventions must dismantle structural barriers and foster gender-inclusive cultures. Recommendations include eliminating discriminatory practices, implementing mentorship programs, utilizing temporary quotas, developing women's leadership skills, and creating equitable organizational environments. Addressing these issues is vital for achieving gender equality and inclusivity within Nigeria's engineering sector [18,19].

The Royal Academy of Engineering's GCRF Africa Catalyst Programme has emerged as a pivotal force in advancing diversity and inclusion (D&I) within Sub-Saharan African engineering institutions. Recognizing the critical importance of diverse perspectives, the Programme has strategically collaborated to dismantle barriers hindering underrepresented groups. Despite a regional deficit in formalized D&I policies, this initiative has demonstrably strengthened institutional capacities and catalyzed tangible progress [20,21,22,23,24,25]. A prime example of this impact is the Nigerian Institution of Mechanical Engineers (NIMechE). With the Programme's support, NIMechE developed and successfully implemented a comprehensive D&I policy, resulting in concrete achievements, notably increased female representation on its National Council. By embedding gender, equality, disability, and social inclusion (GEDSI) principles into its core operations, NIMechE has fostered an inclusive culture and ignited broader engagement within the Nigerian engineering community, underscoring the vital role of these principles in professional advancement and social inclusion [26].

Building upon this momentum, the APWEN/PEIs mini gender audit has further solidified stakeholders' commitment to institutionalizing gender mainstreaming, aligning with global standards of 30% affirmative action [27]. The subsequent adoption of a comprehensive APWEN D&I policy by the entire Nigerian engineering community has yielded unprecedented opportunities for female engineers. This transformative shift is evidenced by a significant surge in their leadership representation across the engineering ecosystem and government board appointments, marking a pivotal advancement in the participation of Nigerian female engineers in decision-making processes [28,29,30].

Hence, the desire to provide a comprehensive analysis of the gender landscape within Nigerian engineering ecosystem, with the goal of driving positive change and fostering a more equitable and inclusive professional environment forms the main thrust of this paper.

1.1 Scope of the Work

The APWEN/PEIs mini gender audit is a crucial step towards promoting gender mainstreaming within the Nigerian Society of Engineers (NSE). By evaluating policies, programs, and structures, the audit aims to identify opportunities for improvement and create a more inclusive environment. This study focuses on assessing gender mainstreaming achievements within APWEN and Nigerian PEIs by examining human resources policies, and mapping the needs of women, men and person with disabilities in their programs.

It addresses key thematic areas, such as; management support, work-life balance, staffing practices, policy formulation, advocacy, public relations, and organizational culture. While the audit's scope may be limited by resource constraints, its findings and insights can contribute significantly to building a more inclusive and equitable engineering profession in Nigeria. It hopes to shed light on institutional practices, fosters organizational enlightenment, and provides valuable information for future efforts towards gender equality.

1.2 Limitation of the Gender Audit.

The gender audit encountered obstacles that impacted its scope and depth. Participation was lower than anticipated, hindered by poor turnout and difficulties in reaching government personnel. While participant numbers fell slightly short of the ideal, the audit successfully achieved geographical diversity. Scheduling some interviews proved challenging due to packed schedules, and access to internal documents was restricted, limiting the thoroughness of the review.

Nevertheless, the audit yielded significant information concerning gender dynamics within engineering membership institutions. Even with the noted limitations, the gathered data is crucial for developing recommendations aimed at promoting gender equality and inclusivity within the engineering field. These findings offer a basis for actionable strategies to address existing disparities and create a more equitable professional environment [31].

2 METHODOLOGY

The gender audit adopted a participatory approach, involving the Gender Working Group and key stakeholders to ensure a comprehensive and inclusive assessment. The methodology included the following key steps:

- A framework outlining the scope and objectives of the audit was developed to guide the assessment process.
- A meeting was held to clarify the audit's goals, identify stakeholders, and discuss the scope of inquiry.
- Internal and public documents related to gender inclusion and human resources practices were analyzed to gather relevant information.
- Interviews were conducted with members and associates of Nigeria Society of Engineering (NSE), Council for Regulation of Engineering in Nigeria (COREN), and APWEN to collect firsthand perspectives and insights.
- Surveys were administered to a diverse group of members and staff to gather their views and perceptions on gender dynamics within the engineering sector.

3 DATA ANALYSIS AND INTERPRETATION OF FINDINGS

3.1 Demographic Profile of Respondents

3.1.1 Distribution of Respondents by Gender

The gender audit questionnaire garnered responses from 135 individuals, comprising 87 females and 48 males among the members (refer to figure 1). Conversely, the staff respondents consisted of 70% males and 30% females. All participants were associated with either the NSE, APWEN, or COREN. The data reveals a gender participation disparity within Nigerian engineering organizations (NSE, APWEN, COREN): female members were more responsive, while members/staff respondents were predominantly male, highlighting a potential gender imbalance. The audit's focus on these specific organizations suggests a targeted effort to address gender dynamics within the Nigerian engineering sector.

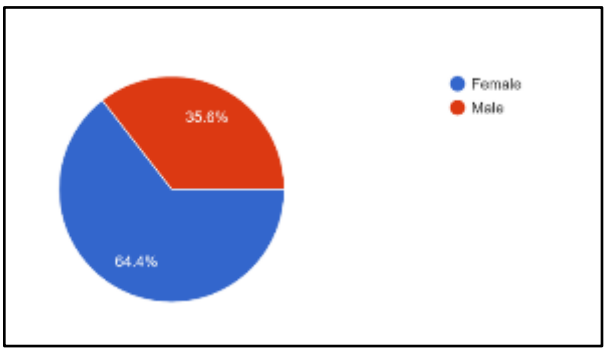

Figure 1: Gender Distribution of Member Respondents by Gender

3.1.2 Socio-demographic Characteristics of Respondents

The socio-demographic analysis of respondents (refer to table 1) reveals a predominantly male and mature demographic within the engineering sector (i.e., NSE, APWEN, or COREN). While the majority of respondents were male (35.6%), a significant portion were also aged above 50 (35.6%), followed by the 41-50 age bracket (28.9%).

Most respondents were married (80%), and a high percentage held at least a master's degree (60.7%). The respondent data showcased a clear gender divide, with female members outnumbering males, while staff was predominantly male, suggesting varied gender representation across the organization's levels. Despite this, both groups shared a high level of education, with many holding advanced degrees, and were largely married. The limited number of staff respondents, however, warrants attention in the analysis. The prevalence of older respondents in both the member and staff categories provide a valuable backdrop for understanding the audit's results.

This mature and well-educated demographic offers insights shaped by extensive experience, which are crucial for accurately interpreting the audit's outcomes and formulating effective, context-aware recommendations.

Table 1: Socio-Demographic Characteristics of Respondents

	Members		**Staff**	
Gender	Frequency	Percent	Frequency	Percent
Female	87	64.4	3	30
Male	48	35.6	7	70
Total	135	100	10	100
Age	Frequency	Percent	Frequency	Percent
20 – 30	12	8.9	2	20
31 – 40	36	26.7	2	20
41 - 50	39	28.9	4	40
51 and above	48	35.6	2	20
Total	135	100	10	100
Marital status	Frequency	Percent	Frequency	Percent
Divorced/Separated	5	3.7		
Married	108	80	7	70
Single	21	15.6	2	20
Single Parent	1	0.7	1	10
Total	135	100	10	100
Level of education	Frequency	Percent	Frequency	Percent
OND/HND	2	1.5	2	20
BA/BSc/B.Eng.	51	37.8	4	40
Masters and above	82	60.7	4	40
Total	135	100	10	100

3.1.3 Position and Institutional Affiliation of Staff and Members

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3.2 Analysis of Staff and Member Perception Regarding Gender, Equality and Equity.

3.2.1 Comprehension of Gender Among Staff and Members

In examining the understanding of gender among staff and members, the Gender Audit focused on three key questions: comprehension of the term 'gender,' availability of sex-disaggregated data, and the existence of a written gender policy affirming commitment to gender equity.

Table 2: Staff Respondents' Perspectives on Gender

Ever heard the terminology 'gender'	Frequency	Percent
No	1	10.0
Yes	9	90.0
Total	10	100.0

The gender audit revealed a mixed understanding of the term "gender" among staff and members of the engineering sector (refer to table 2). While most respondents (i. e. 90%) were familiar with the term, a significant 67% equated gender solely with biological sex, demonstrating a limited understanding of gender as a social construct. In addition, members were initially unaware of the availability of sex-disaggregated data, indicating a need for increased awareness and data collection efforts.

To enhance understanding of gender issues and promote gender equality, the engineering sector should prioritize gender awareness training, emphasize the importance of sex-disaggregated data, implement data collection systems, and foster a culture of inclusivity. By addressing these recommendations, the engineering sector can take significant steps towards achieving greater gender equality.

3.2.2 Presence of Gender Diversity and Inclusion Policies

The data from Tables 3 and 4 reveals a significant lack of clarity and awareness regarding gender diversity and inclusion policies within the engineering sector. Only one PEI (i.e., NIMechE) was found to have a comprehensive gender equality policy as at then, while the NSE and other PEIs lacked specific gender-focused measures. From Table 3, it could be seen that only 20% of respondents confirmed the existence of a written gender policy affirming commitment to gender equity, with a minority affirming the integration of gender considerations into strategic planning processes. Approximately half of the respondents acknowledged the existence of gender diversity and inclusion policies within their organizations, while a significant proportion remained uncertain (refer to figure 4). These findings underscore the urgent need for widespread awareness campaigns and advocacy efforts and adoption of such gender and inclusion policies., to mainstream gender across PEIs and affiliated organizations.

Table 2: Staff Response to Availability of Gender policy

Organization has a written gender policy that affirms a commitment to gender equity	Frequency	Percent
I do not know	4	40.0
No	4	40.0
Yes	2	20.0
Total	10	100.0
If yes, is gender taken into account during strategic planning process for your organization?	Frequency	Percent
Not applicable	8	80.0
Yes	2	20.0
Total	10	100.0

Table 4: Members' Responses on Gender Diversity and Inclusion Policy

Existence of gender diversity and inclusion policy	Frequency	Percent
Don't know	5	3.7
No	60	44.4
Yes	70	51.9
Total	135	100.0

3.2.3 Existence of Affirmative Action Policies to Address Gender Disparity

The data from Tables 5 and 6 reveals a significant lack of clarity and awareness regarding affirmative action policies aimed at rectifying gender imbalances within the NSE and PEIs. A large portion of respondents (47.4%) expressed uncertainty about the existence of such policies. highlighting a communication gap. Furthermore, both staff and members demonstrated limited awareness of these policies, indicating a need for improved dissemination of information.

While some organizations may have implemented measures to ensure equal work opportunities, the data suggests a limited focus on affirmative action policies specifically designed to address gender disparities. Additionally, only a small number of organizations have gender-responsive objectives embedded in their recruitment and selection policies, underscoring the need for more targeted efforts to promote gender equality.

To address these challenges, the NSE and PEIs should conduct comprehensive gender reviews, develop clear affirmative action policies, increase awareness of these policies, and embed gender-responsive objectives in their recruitment and selection processes. By taking these steps, they can create a more inclusive and equitable environment for women in the engineering profession.

Table 5: Presence of Policies Addressing Gender Disparity

Existence of policy on affirmative action to correct glaring disparity in the representation of men and women	**Frequency**	**Percent**
No	40	29.6
Not Sure	64	67.4
Yes	31	23.0
Total	135	100.0

Table 3: Inclusivity and Equal Opportunity (Staff Survey)

Existence of policy on affirmative action to correct glaring disparity in the representation of men and women	**Frequency**	**Percent**
No	1	10.0
Not Sure	9	90.0
Total	10	100.0
Existence of deliberate actions to ensure equal opportunities for work or employment	Frequency	Percent
I do not know	2	20.0
No	1	10.0
Yes	7	70.0
Total	10	100.0
Existence of a policy encouraging more women to apply in male- dominated areas and vice-versa	Frequency	Percent
No	3	30.0
Not Sure	5	50.0
Yes	2	20.0
Total	10	100.0

3.2.4 Policies Encouraging Cross-Gender Applications

The data presented in Table 7 reveals a significant degree of uncertainty among organizations regarding the existence of a policy aimed at encouraging individuals to apply for areas traditionally dominated by the opposite sex. This

ambiguity underscores the need for greater clarity and communication on this matter. A substantial portion of organizations (35.6%) expressed uncertainty bout the existence of a gender and diversity policy within their organization, highlighting a lack of clarity or awareness. In addition, over a quarter of organizations (31.1%) were unaware of the policy, even if it existed, suggesting a need for improved dissemination of information.

Furthermore, there is a lack of consensus on this issue, with some organizations affirming the existence of a policy while others expressing doubt. To address these concerns, organizations should take proactive steps to clarify the existence or absence of such a policy, increase awareness among staff and members, and regularly review and update the policy to ensure its alignment with current best practices and organizational goals. By implementing these measures, organizations can foster a more inclusive and equitable workplace culture.

Table 4: Existence of Policy Encouraging People to apply for Areas Dominated by the Opposite Sex.

Existence of policy encouraging people to apply for areas dominated by the opposite sex	Frequency	Percent
No	42	31.1
Not Sure	48	35.6
Yes	45	33.3
Total	135	100.0

3.2.5 Integration of Gender Considerations.

According to the staff survey, approximately 40% of respondents indicated the provision of 6-month maternity leave, while the remainder reported a 3-month leave option (refer to table 8). Notably, only a small percentage identified gender-responsive objectives in their organization's recruitment policies. Table 9 outlines the existing strategies, systems, and policies within representative engineering organizations aimed at fostering gender consideration. These include a creche for nursing mothers, an equal employment opportunity policy, flexible working arrangements, increased maternity leave, separate toilets, and a sexual harassment policy. While these measures demonstrate positive steps towards gender equality, several areas require further attention. Firstly, the data lacks information on policies addressing gender pay gaps, promotion opportunities, and unconscious bias.

Secondly, the focus on maternity leave without mentioning paternity leave could be improved to promote equal parental responsibility. Thirdly, the absence of policies specifically addressing non-binary or transgender employees highlights a need for greater gender inclusivity. Finally, the data does not provide insights into initiatives that promote gender diversity in leadership, which is crucial for fostering a more inclusive work culture.

Table 8: Existence of Fair Gender-Friendly Recruitment Policies.

Existence of policy encouraging gender-friendly recruitments		
6 Months maternity leave	Frequency	Percent
No	79	58.5
Not Sure	2	1.48
Yes	54	40
Total	135	100
3 months leave option	Frequency	Percent
No	41	30.37
Not Sure	13	9.63
Yes	81	60
Total	135	100
Gender friendly recruitment policies	Frequency	Percent
No	120	89
Not Sure	7	5.1

Yes	8	5.9
Total	135	100.0

Table 9: Strategies/Systems/Policies that exist in Representative Organizations (Staff Survey)

Creche for nursing mothers
Equal employment opportunity policy
Flexible working arrangements
Increased period for maternity leave
Separate toilets for male and female
Sexual Harassment Policy

3.2.6 Challenges in Incorporating Gender Dimension to Policies and Programs.

Figure 2 shows that organizations under study struggle to integrate gender analysis into their policies and programs. The main challenges they face include a lack of organizational focus on gender issues, cultural barriers, and insufficient training for staff on gender topics. These findings were consistent with the responses from both members and staff, emphasizing the need for more comprehensive gender awareness and training initiatives.

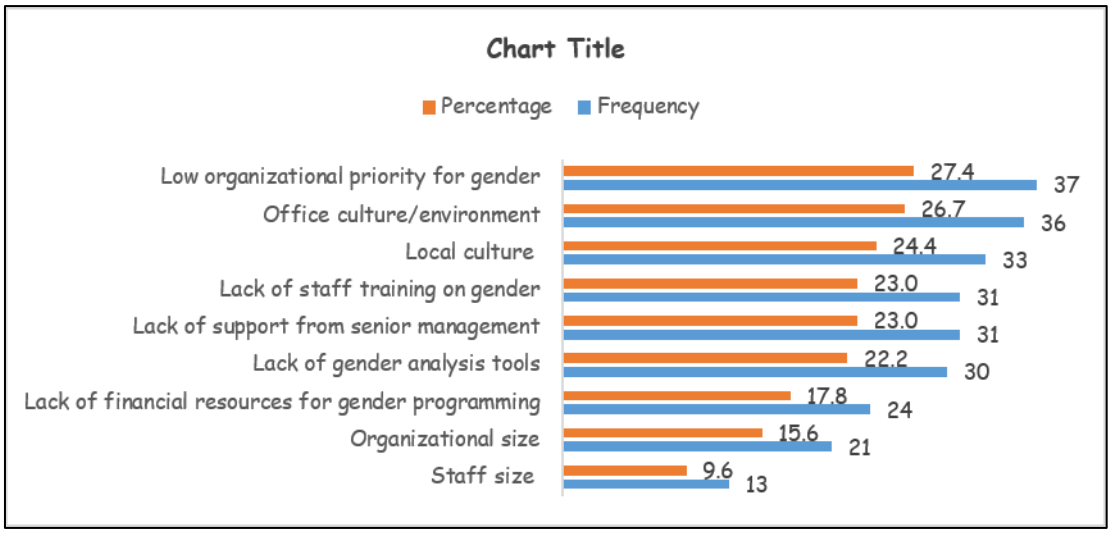

Figure 1: Obstacles to incorporating gender analysis in policies/programmes/project

3.3 Staff and Member Perception of Institutions' Response to Sexual and Gender-Based Violence (SGBV).

Although many engineering institutions have implemented sexual harassment policies and safe reporting spaces (refer to table 10), there are still gaps in their efforts to address sexual and gender-based violence (SGBV). While most respondents reported the presence of these measures, interviews revealed a need for more comprehensive policies and support services.

To enhance organizational responses to SGBV, institutions should review and update existing policies, establish accessible reporting mechanisms, provide adequate support services, conduct regular training, and foster a culture of respect. By implementing these recommendations, engineering institutions can create a safer and more inclusive environment for their members and staff.

Table 10: Availability of Sexual Harassment Policy and Safe Spaces

There is a policy that responds to sexual harassment	Frequency	Percent
I do not know	3	30.0
No	1	10.0
Yes	6	60.0
Total	10	100.0
There are safe spaces for women to freely report if their rights are being violated	Frequency	Percent
I do not know	3	30.0
No	2	20.0
Yes	5	50.0
Total	10	100.0

3.4 Women's Representation in Decision-Making Positions

Figure 3 illustrates perceptions of increased women's representation in senior management positions, with a majority of respondents acknowledging progress in this area. Table 11 further delineates respondents' opinions regarding the augmented representation of women in decision-making roles, indicating a favorable trend. However, challenges persist, as reflected in respondents' ratings of their influence in decision-making processes and the limited representation of women in engineering institutions.

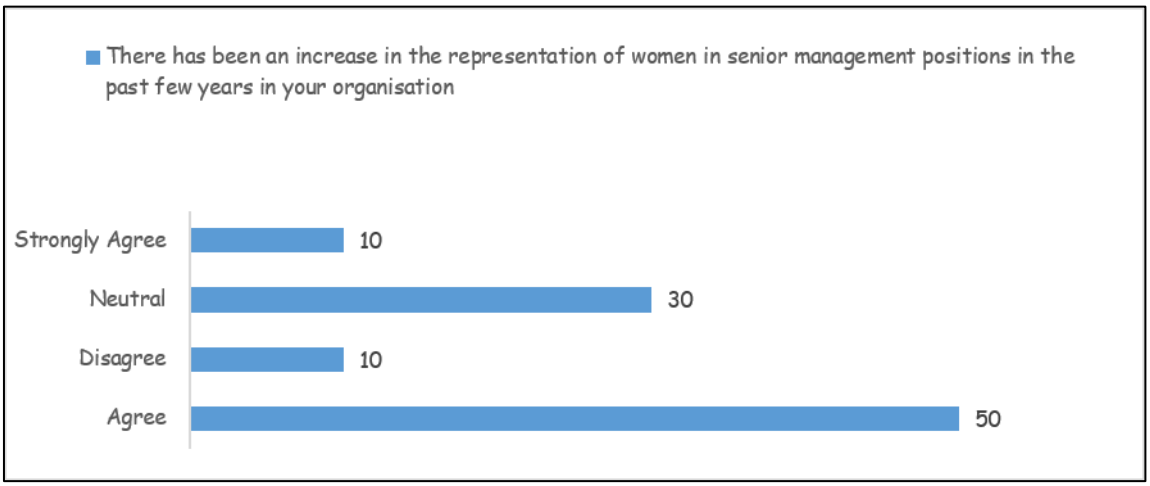

Figure 3: Increase in women representation in senior management Position

Looking at the data in Table 11, we observe a significant spread in the responses, with a standard deviation of 17.39. The minimum value is 8.9%, and the maximum value is 50.4%. The median is 14.1%, indicating that half of the respondents perceived a less than 14.1% increase in the representation of women in decision-making positions over the past few years. In all, the data presents a mixed picture. While a significant number of respondents (50.4%) reported an increase in women's representation, there is no clear consensus on the extent of this change. This ambiguity highlights the need for further analysis and targeted interventions to promote gender equality in decision-making roles.

Table 11: Frequency distribution of responses by increase in representation of women in decision making positions

There has been an increase in the representation of women at decision making positions in the past few years in your organization	Frequency	Percent
Agree	68	50.4
Disagree	12	8.9
Neutral	24	17.8
Strongly Agree	19	14.1
Strongly Disagree	12	8.9
Total	135	100.0

Key findings from this analysis reveal a range of challenges and opportunities. Despite ongoing efforts to incorporate gender perspectives, significant gaps remain in policy formulation, gender awareness, and representation. To address these issues, comprehensive policy reviews, targeted advocacy, and enhanced gender mainstreaming initiatives are essential to foster inclusivity and equality within engineering institutions and affiliated bodies.

4 CHALLENGES IMPEDING PROFESSIONAL DEVELOPMENT

4.1 Challenges Encountered by Female Engineers

Female engineers encounter a myriad of challenges that impede their professional advancement and hinder their ability to thrive in the engineering sector. These challenges, as elucidated by survey respondents and interviewees, underscore systemic barriers rooted in gender bias, societal expectations, and organizational dynamics. Figure 4 illustrates the challenges reported by female engineers, as indicated by respondents in the members' survey. The predominant challenge cited was gender disparity in compensation, promotion, and other benefits (25.2%), followed by instances of sexual harassment at the workplace (24.4%) and discouragement from family to pursue and practice engineering (24.4%). The least mentioned obstacles included ageism (6.7%) and sexual assault (7.4%).

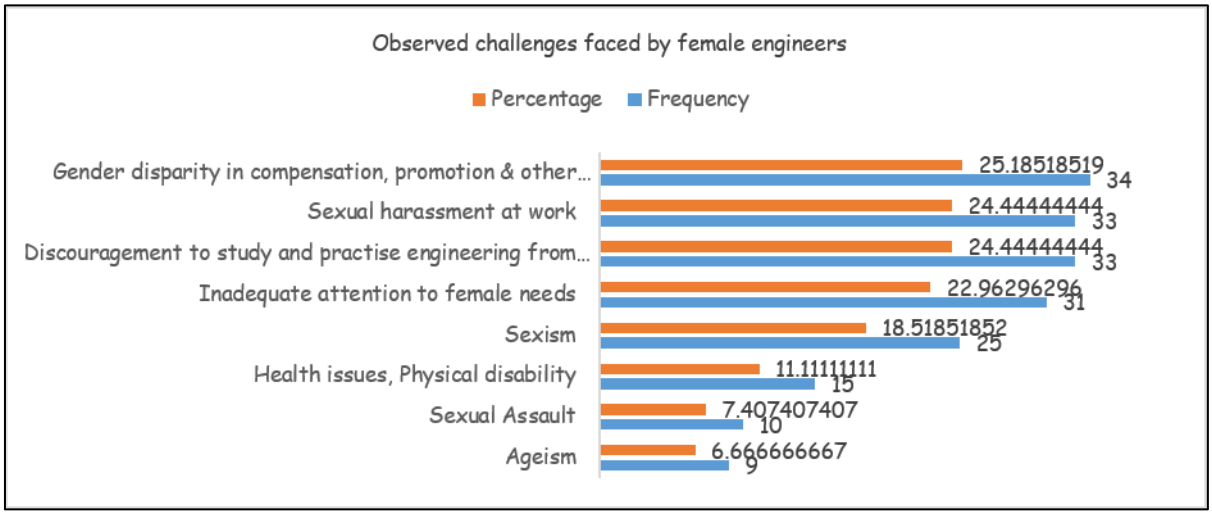

Figure 4: Observed challenges faced by female engineers.

Outside these core challenges, female engineers may struggle to integrate into a predominantly male dominated field. Negative societal perceptions, stereotypes, and biases can create a hostile environment and limit opportunities for women in engineering. In addition, instances of discrimination and bullying within the workplace can further hinder the advancement of female engineers. Addressing these challenges requires a multifaceted approach that involves combating sexism, promoting work-life balance, providing mentorship and sponsorship opportunities, and challenging societal stereotypes. By creating a more inclusive and supportive environment, the engineering sector can empower female engineers and foster gender equality.

4.2 Challenges Faced by Persons with Disabilities in the Engineering Sector

Persons with disabilities in the engineering sector face a myriad of challenges that hinder their full participation and career advancement. These challenges encompass both physical and attitudinal barriers, creating a hostile environment for individuals with disabilities. Insights from staff responses on accessibility for persons with disabilities reveal mixed opinions. While 20% of staff believe that the workplace is accessible, 20% disagree, and 50% remain neutral. The reported lack of ramps and designated parking for persons with physical disabilities indicates a significant accessibility issue, highlighting the need for improvements in the physical environment to accommodate the needs of individuals with disabilities. Furthermore, the mixed opinions among staff regarding overall workplace accessibility highlight the need for further investigation and improvement efforts.

Beyond physical barriers, persons with disabilities also face attitudinal challenges (refer to Figure 5). Negative societal attitudes towards disability can create a hostile environment, limiting opportunities for individuals with disabilities to thrive in the engineering sector. In addition, the lack of assistive technology and limited access to federal-funded programs as reported by 70% of the respondents (refer to table 12) exacerbates these challenges, emphasizing the need for greater inclusivity and support.

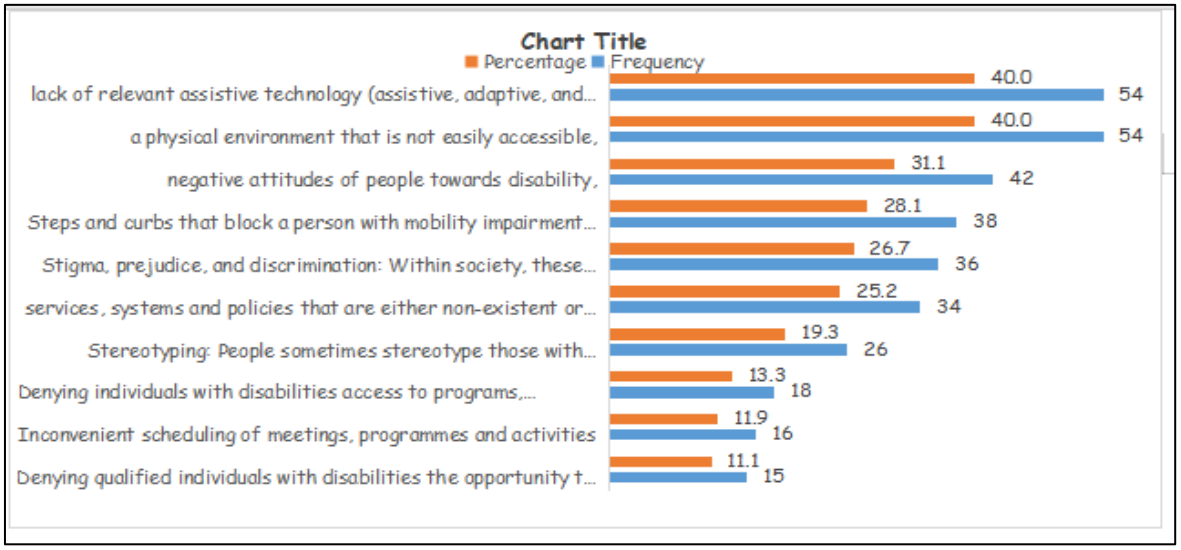

Figure 5: Challenges Faced by Persons with Disabilities in the Engineering Sector

Table 12: Staff Response to Challenges Faced by Persons with Disabilities

Persons with physical challenges are able to easily maneuvers and/or engage within our workplace	**Frequency**	**Percent**
Agree	2	20.0
Disagree	2	20.0
Neutral	5	50.0
Strongly Disagree	1	10.0
Total	10	100.0
Existence of ramps, specialized parking for persons with physical disabilities	Frequency	Percent
No	7	70.0
Yes	3	30.0
Total	10	100.0

4.3 Key Challenges with Mainstreaming Gender in the Engineering Sector

The analysis then focused on the key challenges associated with mainstreaming gender in the engineering sector. Respondents identified several significant obstacles. These included the low representation of women, the absence of clear gender equality policies, inadequate leadership engagement, and limited training on gender issues. Cultural and societal norms, such as patriarchy and gender stereotypes, posed significant barriers to gender mainstreaming efforts. This necessitated systemic interventions and cultural shifts to promote inclusivity and gender equality within the engineering profession.

Recommendations

The following recommendations are hereby outlined for specific actions to address the identified challenges:

- At the organizational level, it was recommended that engineering institutions:

Develop and implement a comprehensive gender equality policy, establishing clear goals, strategies, and accountability measures to address gender disparities within the NSE, APWEN, and PEIs [32,33].

Establish gender equality committees at all organizational levels to oversee the policy's implementation, monitor progress, and provide recommendations.

Mandate gender sensitivity training for all staff and members to promote awareness of gender-based issues and foster a more inclusive environment.

Conduct a thorough review and amendment of existing organizational policies and procedures to ensure alignment with gender equality principles and prevent discriminatory practices.

Collect and analyze sex-disaggregated data on various aspects of organizational activities, such as membership, leadership positions, and program participation, to identify and address gender gaps.

- For membership and staff, the recommendations included:

Providing mentorship and sponsorship programs to support women's career advancement and provide professional development opportunities [34].

Offering flexible work arrangements, such as remote work, part-time options, and parental leave, to accommodate women's needs and promote work-life balance [35].

Ensuring equal compensation and benefits for all members and staff, regardless of gender [36].

Developing clear policies and procedures to prevent and address harassment and discrimination, and providing support services for victims [37,38,39].

- Regarding public engagement and advocacy, the paper suggested that institutions:

Collaborate with external organizations working on gender equality to share knowledge, resources, and best practices [40,41,42].

Advocate for policy changes at the national and local levels that promote gender equality and women's empowerment [32, 43].

Conduct public awareness campaigns to challenge gender stereotypes and promote the importance of gender equality in the engineering profession.

5 CONCLUSION

From the foregoing, the following can be concluded;

The gender audit of the Nigerian engineering community revealed substantial obstacles to achieving gender equality within the sector. Although some advancements have been made, focused initiatives are now required to foster diversity, equity, and inclusion.

Implementing the recommended actions will create a more equitable and inclusive workplace for all members and staff. This will not only improve the experiences of female engineers but also contribute to a broader culture of inclusivity and career progression within the Nigerian engineering sector.

Finally, it is crucial for leading figures in Nigerian engineering to actively address gender inequalities and promote gender equality. These organizations must demonstrate strong leadership and take concrete steps to build a more inclusive and fair future for the field."

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

Acknowledgments

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Disclosure of conflict of interest

The authors hereby declare that no competing interests exist.

Statement of informed consent

The authors hereby declare that informed consent was obtained from all individual participants included in the study.

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