



# Effectiveness of gender policies in achieving gender equality in ocean science programmes in public universities in Kenya

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## ABSTRACT

The recently proclaimed Ocean Decade by the United Nations General Assembly is committed to gender equality and women's empowerment in ocean science research and governance. This paper examines the status of gender equality in ocean science research across higher education institutes in Kenya. Kenya has ratified international conventions for gender equality and developed national and institutional gender equality and sexual harassment policies as its commitment to promoting equitable access to education. However, it is poorly understood whether the implementation of these policies has been successful at the institutional level. This study explores the effectiveness of the institutional gender policies in public universities delivering ocean science-related degrees. Existing policies were analysed using the Gender Integration Continuum and gender ratios of enrolled students and recruited staff in ocean science-related fields investigated. The study identified that while some policy provisions included gender-transformative strategies to increase women in science-related courses, many were outdated. Gender-disaggregated data showed fewer female students and female staff in management positions compared to men. Additionally, the proportion of women in academic posts declined with the seniority of employment level, and women were more likely than men to occupy non-tenured positions. In conclusion, it appears that the presence of gender policies does not necessarily translate to gender balance across the universities. We offer some explanations as to why this should be and where to direct future research needs.

## 1. Introduction

There is a rapidly growing recognition of the importance of gender equality in realising UN Sustainable Development Goals (UNSDGs) across sectors [24,25]. Gender equality (itself one of the UNSDGs) can accelerate progress towards a more equitable and sustainable future for all [3,71]. Increasing access to educational opportunities for women and men needs urgent attention to ensure better and effective governance, enhanced productivity and socio-economic growth [8,17,76]. Achieving gender equality in education also, critically, promotes equitable power distribution and sustainable management of resources at all levels [61, 64,74]. The UN's Decade of Ocean Science for Sustainable Development has committed to gender equality and women's empowerment to achieve a sustainable future for the oceans. Gender equality provides equal opportunities to both women and men to participate in and increase the research, discoveries and innovations needed to reverse declining ocean health [19,25,65].

In Kenya, despite progress toward gender equality in specific

academic programmes like arts and social sciences, a significant gender gap is still reported in Science, Technology, Engineering and Mathematics (STEM) education [34,52,54]. Reports indicate persistent gender inequality in public and private universities, with glaring gender disparity reported in STEM fields ([35]; [39]; [9]). The "education for all" slogan of the national government appears to be more on paper than in practice, resulting in a lack of progress towards gender equality in STEM subjects [42,47,70,72]. According to the 2020 and 2021 Global Gender Gap report ([79]; [80]), Kenya has attained gender parity in primary education, and the gender gap has reduced in secondary levels, but disparities tend to deepen in higher education, with a much lower representation of women in sciences where men make up the majority of students and academic staff. Onsongo [52] reported 30% lower enrolment of female students in selected public universities and 40% in private universities. Cultural barriers, gender stereotypes, gender discrimination, sexual harassment, lack of role models and mentorship programmes have all been found to hinder the active participation of women in higher education [54]. Elsewhere, sexual harassment has

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been documented throughout the higher education sector, and public universities have been described as some of the most dangerous spaces for female students and staff [10,75,77]. Kenyan public universities are no exception as highlighted by the Kenyan media and previous studies [43,60,75].

Kenya has ratified critical international legal frameworks concerning gender equality. These frameworks include the Beijing Declaration and the Platform for Action [7] (UN [1,57,67]), the UN Sustainable Development Goals (2015) [22,44], and the UN Decade of Ocean Science for Sustainable Development [41,59], some of which have informed national legislative and gender policy measures [44]. Kenya has also developed national gender policies, including Gender Equality in Education (2007) and the Education and Training Sector Gender Policy (2015). As a result, gender equality and sexual harassment policies have been developed in many universities. However, it is not clear how effective these frameworks for gender equality have been, and it is evident that gender disparity remains, particularly in top-level decision-making positions ([32]; [31]).

Ocean science has become a global priority with the launch of the UN Decade of Ocean Science for Sustainable Development in 2021 [58]. As co-host with Portugal of the UN Oceans conference in 2022, Kenya is at the forefront of international ocean policy. To date, there has been no systematic evaluation of the role of women in ocean science in Kenya, nor of the effectiveness of national and institutional gender policies in the ocean science sector. This is, then, a timely opportunity to champion the participation of women in ocean science research and governance in Kenya. According to Gasper [23], ‘effectiveness’ is one of the criteria of policy evaluation which typically refers to the fulfilment of policy objectives. A policy is considered adequate if its outputs have contributed to achieving the intended objectives [49]. Evaluation of gender policy in education has been performed by a number of scholars in developed and developing countries, including Kenya [5,6], but this study is the first of its kind to explore gender equality specifically in ocean science education and research. Ocean scientific research is crucial in understanding the complexity and interconnectedness of marine ecosystems and developing socially, ecologically and economically sustainable solutions for the ocean [11,16,25]. Inadequate access to education and decent employment opportunities in ocean science fields are impediments to gender equality and sustainable development [6], despite women playing an essential role in ocean science sectors such as fisheries and aquaculture, thus significantly contributing to the national economy ([14,38]; UN [69]). Here, we ask what effect gender policies have had on the participation of women students and staff in ocean science programmes in eight public universities in Kenya.

This study evaluated the policies using the Gender Integration Continuum (GIC) framework adopted from the USAID Interagency Working Group [28]. The GIC is based on six thematic areas derived from the national gender policy in the education sector: access; equity; quality of education; safety and gender-based violence (GBV); nurturing and mentoring; and governance and management [56]. The institutional policies were evaluated against the national gender equality policy. Gender-disaggregated data were collected from the universities allowing an exploration of the relationship between these policies and equality of women and men students and staff.

## 2. Materials and methods

Gender policy addresses gender inequality in different sectors, such as higher education [37]. Gender policies often provide the foundation for tackling biases against one gender (most often women) in terms of access to quality education, resource allocation, division of labour, cultural expectations, decision-making and other socially constructed or defined privileges and activities [6,13,63]. The effectiveness of gender policy can be used to determine the extent to which the direct results of interventions contribute to the sustainable achievement of policy objectives (promoting gender equality) at all levels of education [23,49].

### 2.1. Ethical statement

This research was approved by the World Maritime University’s Research Ethics Committee and the National Commission for Science, Technology and Innovation (Research License Approval 824286) prior to data collection. The universities were anonymised to ensure confidentiality in accordance with the approval protocol.

### 2.2. Methodological framework

The GIC adopted as a conceptual framework for this research, was developed by the USAID Interagency Gender Working Group (IGWG) to analyse gender policies [28,40]. In this study, the GIC framework has been used to analyse the national and institutional gender policies of Kenyan public universities to evaluate the strength of each gender policy (Fig. 1).

One gender-blind and three gender-aware categories were used to understand inequalities in higher education (see Fig. 1). These categories demonstrate how the policies treat gender norms and roles as well as disparities in enrolment of students and recruitment of staff.

The term, “gender-blind” refers to the policies that ignore gender norms and power dynamics between women and men at different levels among the students and within the university management. Gender-blind policies may intentionally or unintentionally fail to address the problem of gender stereotypes in staff recruitment [28]. Being “gender-aware” refers to policies that adopt a gender-responsive approach to address gender inequality, although these vary in degree. This framework is a modified version of the original by IGWG [28]. It was modified by replacing the ‘gender-exploitative’ sub-category with one that is defined as ‘gender-neutral’. Here, the sub-categories of gender-aware policies include gender-neutral, gender-accommodating and gender-transformative. This approach gives a better understanding of policy provisions based on their meaning and how the strategies were framed in the reviewed policy documents.

Being “gender-neutral” focuses on overall impact, and it is not explicitly aimed at either women or men and is assumed to affect both sexes equally [33]. The gender-neutral policy ignores that some policies can consolidate gender norms and power imbalances to exploit the underrepresented gender, particularly women; for example, a policy that does not have parental leave protection and flexible working arrangements. Gender-accommodating policies, on the other hand, acknowledge and respond to existing gender relations and inequalities. For example, policies that encourage women to enrol in science courses but fail to address stereotypes hindering women’s participation in these fields. Strategies may be developed and implemented by actively meeting the different needs of women and men though they are not designed to change gender norms [28].

Gender-transformative policies are specific and attempt to promote equitable gender norms which support gender equality and lead to improved education for all. These policies actively and explicitly question, examine and change existing harmful gender norms and power imbalances between women and men. They encourage critical awareness of gender roles, support women’s empowerment, and challenge resource distribution and allocation of duties between women and men [28]. These transformative policies equally engage women and men in decision-making and policy implementation to advocate for women’s rights and strengthen women’s influence and voice in governance. With the help of the above criteria together with gender assessment sub-criteria modified from Aura et al. [4], institutional gender policy documents were systematically evaluated.

### 2.3. Data collection and analysis

The study was conducted in eight public universities in Kenya from June to October 2021. Kenya was chosen as a case study because it is one of the models for the Blue Economy Initiative championed by the Food

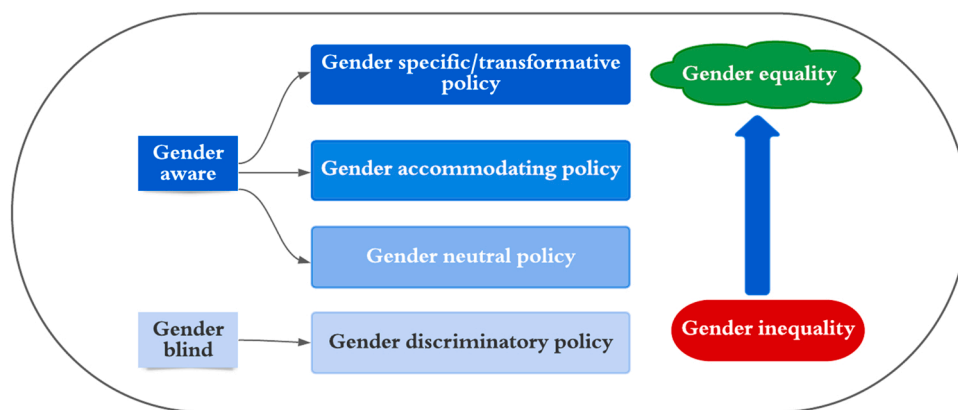


Fig. 1. Adaptation of the GIC conceptual framework on gender policy analysis illustrating the different steps along the continuum (Source: Modified from [28]).

and Agriculture Organization of the United Nations (FAO) in 2018 as a strategy for achieving integrated, sustainable, and socio-economically sensitive management of oceans [14,21,45]. Moreover, the 2022 UN Ocean Conference was co-hosted by the governments of Kenya and Portugal, highlighting the need for urgent measures and actions to protect and manage oceans sustainably.

Public universities were selected for this study because they offer programmes at a lower fee than private ones and thus encompass an economically more comprehensive range of society. Therefore, we expected more diverse students from public universities from different ethnic groups, income levels and socio-economic status. Ten out of thirty-seven public universities in Kenya (Ministry of Education, 2018) were selected purposively based on the criterion that they offer ocean science-related courses [48,66], as per the aim of this paper, which was to analyse gender policies and women’s representation in ocean science universities. The baseline for gender policy analysis was the Kenyan national gender policy, and public universities play a vital role in its implementation. However, only eight of these ten selected universities (80%) participated in this study by providing some or all of the requested data.

This study used a similar approach to Barahona-Fuentes et al. [5]. They examined the possible impact of gender equality policies on women in maritime education and training institutions offering marine engineering and nautical sciences and maritime transport studies in European and non-European universities. The study was conducted in three steps: 1) Gender policy analysis, 2) Gender ratio analysis of students and staff, and 3) Comparing the two results. We used both document analysis and quantitative methods to evaluate the relationship between gender policies and staff and students’ statistics [18].

Kenya’s National Education and Training Sector Gender Policy (2015) and gender policies of five public universities were assessed. For Step 1, the study began with document analysis of national and institutional gender policies to identify the degree of gender awareness. Gender policy documents were collected from the universities’ websites or by request to the university Gender Centre. The number of gender-specific strategies as a percentage of all policy provisions associated with access, equity, quality of education, safety, mentoring and governance, was used to calculate and rank the level of gender awareness of each policy based on the GIC framework. Following evaluation of the policy documents, the universities were ranked based on the policy awareness, and subsequently coded (Code A being the most aware, Code H the least aware). Data obtained from each university is shown in Table 1. Institutional policies were compared to the national standards and recorded as being above, meeting or below these standards, represented by dark blue, blue and light blue colours respectively.

In Step 2, data on student enrolment in and graduation from ocean science departments, between 2010 and 2019 in long-established

Table 1  
Data obtained from the eight selected public universities in Kenya.

University	Data on students’ enrolment	Data on students’ graduation	Data on staff gender ratios	Gender Equality Policy	Sexual harassment policy
A	✓	✓	✓	✓	✓
B	✓	✓	✓	✓	✓
C	–	–	–	✓	✓
D	✓	✓	✓	✓	✓
E	✓	✓	✓	✓	✓
F	✓	✓	✓	–	–
G	✓	✓	✓	–	–
H	–	✓	–	–	–

universities, and from 2013 to 2019 in recently established universities, enabled change over time to be measured. Data on staff and students were analysed using descriptive statistics: means, the measure of variations, the frequency distribution of academic staff, percentages of female students’ enrolment over the years and women’s representation in management positions. This analysis helped to establish and understand the status and trends of gender equality.

Finally, in Step 3, the degree of gender awareness expressed in each university’s policy was compared with the gender ratios of students and staff positions to explore the relationship between gender policy and gender balance.

2.4. Methodological limitations

It is important to note that this study has limitations. Firstly, the study only targeted departments at the universities offering ocean science-related programmes, and the findings cannot be directly extrapolated to the entire university. Secondly, data was not always complete; a few universities did not have readily available records of the enrolment and graduation of students by gender and had to manually search for the data from the registration booklets. This meant some universities provided only graduation data or could not provide complete data within the time frame of this project. Lastly, the study was carried out during unprecedented times of the covid-19 pandemic when travel restrictions existed in some counties in the western region of Kenya, which complicated access to those universities. Alternatively, those universities were contacted using emails despite low response rates. We, therefore, only evaluated the policy documents that were available to us and analysed the gender ratios of students and staff that the universities provided.

**Table 2**

Overview of the national and institutional gender policy strategies, mainly two categories identified as gender neutral and gender specific strategies (only five universities with gender policies were included in this analysis).

Gender policy assessment criteria with six themes and three policy cycle aspects	Six analytical themes						Three policy cycle aspects		
	Access	Equity	Quality education	Safety, security and gender-based violence	Nurturing and mentoring	Governance and management	Implementation strategies	Monitoring and evaluation	Policy Review
Education and Training Sector Gender Policy (2015)	Out of thirteen (13) policy strategies, only one refers to a gender specific action e.g. re-entry for school girls who become pregnant (Section 2.1)	All the seven (7) policy strategies are gender neutral e.g. enhance gender equity in education through grants, scholarships, loans and other awards (Section 3.1)	All the twenty-three (23) policy strategies are gender neutral e.g. build capacity of instructors and teachers (Section 4.4)	Out of the fifteen (15) policy strategies, only one is gender specific e.g. re-enrol girls who get pregnant (Section 5.4)	Out of twenty-four (24) policy strategies, four are gender specific e.g. ensure one third of student enrolled in STEM are female (Section 6.4)	All the fifty-six (56) policy strategies are gender neutral e.g. ensure gender balancing in the composition of BoMs, Councils and administration (Section 7.2)	Capacity building, advocacy, accountability, gender analysis, partnerships, sustainability, monitoring and evaluation and policy review (Section 8.3)	Collection, analysis and utilization of data disaggregated by age and sex at all levels (Section 8.3)	Every five years (section 8.3)
University A Gender Policy (2011)	Out of the six (6) policy strategies, two are gender specific e.g. advise student mothers to defer if necessary (Section 3.3.4)	Out of the six (6) policy strategies, four are gender specific e.g. enforce equity in scholarship and research to achieve 40% female applicants (Section 3.6.4)	All the seven (7) policy strategies are gender neutral mainstream gender related courses and training modules to all students and staff (Section 3.2.4)	All the nine (9) policy strategies are gender neutral e.g. improve lighting and security on campus (Section 3.4.4)	Out of the five (5) policy strategies, two are gender specific e.g. involve women role models in the academic and professional fields in marketing the university (Section 3.7.4)	Out of six (6) policy strategies, three are gender specific e.g. increase women's participation in the University governance (Section 3.1.4)	Gender mainstreaming, accountability, gender analysis, raise awareness, capacity building, create networks, monitoring and evaluation of gender policy through an institutional framework (Section 4.4)	Capacity building, surveys, mainstreaming gender, affirmative action, organize workshops (Section 4.6)	Not mentioned in the document
University B Gender Policy (2008)	Out of the five (5) policy strategies, one is gender specific e.g. Lowering cluster cut-off points to increase female enrolment (Section 3.3)	Out of the five (5) policy strategies, one is gender specific e.g. make scholarships available that target good female academic staff (Section 3.2)	All the three (3) policy strategies were gender neutral e.g. ensure curriculum is designed and developed in a gender sensitive way (Section 3.4)	All the seven (7) policy strategies are gender neutral e.g. strengthen security systems throughout the University (Section 3.5)	All the three (3) policy strategies are gender specific e.g. present positive female role models in all University's activities (Section 3.6)	Out of the four (4) policy strategies, one is gender specific e.g. increase the number of women in senior management positions (Section 3.1)	Raise gender awareness, advocacy, outreach programmes, sensitization, participatory monitoring and evaluation, public-private partnerships (Section 4.1.3)	Evaluation done every two years, develop indicators, the collection and analysis of data, (Section 4.2)	Every five years (Section 4.3)
University C Gender Policy (2009)	All the nine (9) policy strategies are gender neutral e.g. encourage both male and female students to enrol in STEM subjects (Section 2.1)	Out of the eight (8) policy strategies, six are gender specific e.g. implement affirmative action for qualified females in admission (Section 2.2)	All the four (4) policy strategies are gender neutral e.g. allocate resources to promote research and publications by males and females (Section 2.8)	All the six (6) policy strategies are gender neutral e.g. formulate a Gender Based violence and sexual harassment policy (Section 2.7)	All the five (5) policy strategies are gender neutral e.g. enhance mentoring programmes for students (Section 2.6)	Out of the ten (10) policy strategies, two are gender specific e.g. encourage female appointment and participation in leadership positions (Section 2.4)	Education, training and research, gender mainstreaming, resource mobilization; Advocacy, partnerships accountability, monitoring and evaluation of gender programmes (Section 3.1.1)	Collection, analysis and use of the data, periodic evaluation of programmes, identify indicators and targets, training (Section 3)	Every three years (Section 3)
University D Gender Policy (2014)	Out of the five (5) policy strategies, only one is gender specific e.g. promote supportive measures to retain all students especially the female (Section 3.2)	Out of the seven (7) policy strategies, three are gender specific e.g. implement strategies for supporting female employees especially the reproductive group through maternity leave (Section 3.4)	All the five (5) policy strategies are gender neutral e.g. curricula review for gender sensitivity and responsiveness, (Section 3.3)	All the ten (10) policy strategies are gender neutral e.g. monitor the implementation of sexual harassment and discrimination policy (Section 3.6)	All the ten (10) policy strategies are gender neutral e.g. create a culture of positive-mentoring at the university (Section 3.6)	All the nine (9) policy strategies are gender neutral e.g. embrace affirmative action in appointing staff for leadership positions (Section 3.5)	Gender mainstreaming, capacity building, gender awareness, resource mobilization (Chapter 4, section 4.5 and 4.6)	Generation, analysis and use of data training, regular monitoring and evaluation (Section 4.7)	Not mentioned in the document

(continued on next page)

Table 2 (continued)

Gender policy assessment criteria with six themes and three policy cycle aspects	Six analytical themes			Three policy cycle aspects					
	Access	Equity	Quality education	Safety, security and gender-based violence	Nurturing and mentoring	Governance and management	Implementation strategies	Monitoring and evaluation	Policy Review
University E Gender Policy (2011)	Out of the seven (7) policy specific e.g. encourage women to enrol in science-based subjects (Section 2.1)	All the six (6) policy strategies are gender neutral e.g. help male and female staff to develop their research skills (Section 2.6)	All the four (4) policy strategies are gender neutral e.g. help male and female staff to develop their research skills (Section 2.6)	All the four (4) policy strategies are gender neutral e.g. implement Gender based violence and sexual harassment policy (Section 2.5)	All the thirteen (13) policy strategies are gender neutral e.g. mentorship programmes to support all male and female staff (Section 2.2)	All the thirteen (13) policy strategies are gender neutral e.g. ensure gender balance in appointments to governance and leadership positions (Section 2.2)	Sensitization, implementation of the two policies, seek funds, outreach programmes, capacity building, gender mainstreaming (Chapter 3)	Collection, analysis and use of the data, periodic evaluation of programmes, develop indicators and targets, training (Section 3.8)	Every four years (Section 3.9)

### 3. Results

#### 3.1. Evaluation of gender policies

The second edition of the Kenyan Ministry of Education’s gender policy (2015) was used for this study. Even though it was outdated, it incorporated the new legal framework ushered in by the Constitution of Kenya 2010. The second edition focused more on equal rights for women and men, girls and boys than the first, which focused more on education performance in critical areas. Some of the objectives of the second edition include reducing gender inequalities in access to education, increasing participation for women in STEM courses and ensuring a safe and secure work and learning environment that is free from sexual harassment to all staff and students [56].

Of the eight selected public universities responding to this study, only five had the policy documents publicly available. The contents of these gender policy documents were analysed against the national gender policy as a benchmark using the GIC framework. Six categorical themes were identified in gender policy analysis: access; equity; quality of education; safety, security and gender-based violence; nurturing and mentoring; and governance and management. Further, gender policy analysis also considered three policy cycle aspects: implementation strategies, monitoring and evaluation, and policy review. A detailed comparison, presented in Tables 2 and 3, revealed a gap between the national and institutional policies, with the majority of policy provisions in the national policy document being gender-neutral and only 4% being gender-specific. The universities’ policies, however, were found to have more gender-specific strategies, ranging from 4% to 28%. Affirmative action, role models, mentoring and allocation of scholarships were mentioned as strategies used to increase the participation of female students in most universities. These policies are ranked by examining the percentage of gender-specific strategies in every policy (Table 4). Based on this analysis, the five institutional policies were ranked: the best being University A (28%), followed by University B (22%), University C (19%), University D (9%) and, the lowest, University E (4%). Four of the five policies exceeded the national standards. University A had more robust gender-specific strategies in access, governance and management than the other universities. University B was relatively higher in nurturing and mentorship, and University C was higher in equity but had no specific provision on access to higher education (Table 3).

The institutional policy documents reviewed in this study were all outdated and beyond their stated review period. Three universities indicated that their policy review period was already behind schedule. For instance, University A was to review its document every five years but was eight years late, University B had committed to reviewing after every three years but was nine years late, and university D was due to review every four years but was six years late.

#### 3.2. Gender representation of staff in public universities

##### 3.2.1. Female representation in governance and management positions

The low representation of women was recorded in all four senior management positions: Chancellor, Vice-Chancellor, university council members and head of department (Table 5). Out of the eight Chancellors, only two were women. Three out of the eight Vice-Chancellors and heads of department were women, that is barely above the 30%, which constitutes the bare minimum or acceptable limits stipulated in the Constitution of Kenya 2010. In university councils, only two universities had women’s representation above 30% (University C with 43% and University G with 33%), while the rest had the lowest proportions of women, recorded below 25%.

As shown in Table 5, overall findings showed that top management positions tend to be occupied by men in all the universities and that there was no positive relationship between the policy quality and the representation of women in management. Notably, most universities with gender policies performed the same as those without gender

**Table 3**

Analysis of the percentages of gender-specific strategies for all the six different themes concerning the Gender Integration Continuum framework.

Gender policies	Percentages of gender specific strategies in each thematic area					
	Access	Equity	Quality education	Safety, security, and GBV	Nurturing and mentoring	Governance and management
Education and Training Sector Gender Policy	8%	0%	0%	7%	17%	0%
University A Gender Policy	33%	67%	0%	0%	40%	50%
University B Gender Policy	20%	20%	0%	0%	100%	25%
University C Gender Policy	0%	75%	0%	0%	0%	20%
University D Gender Policy	20%	43%	0%	0%	0%	0%
University E Gender Policy	29%	0%	0%	0%	0%	0%

**Table 4**

Comparative analysis between national and institutional gender policies.

Gender policy assessment criteria	Access	Equity	Quality education	Safety, security and GBV	Nurturing and mentoring	Governance and management	Gender specific strategies (%)
University A Gender Policy	Dark blue	Dark blue	Blue	Light blue	Dark blue	Dark blue	28%
University B Gender Policy	Dark blue	Dark blue	Blue	Light blue	Dark blue	Dark blue	22%
University C Gender Policy	Light blue	Dark blue	Blue	Light blue	Light blue	Dark blue	19%
University D Gender Policy	Dark blue	Dark blue	Blue	Light blue	Light blue	Dark blue	9%
University E Gender Policy	Dark blue	Light blue	Blue	Light blue	Light blue	Dark blue	4%

\*Note: The colours represent; Dark blue = above, Blue = meet, and Light blue = below national policy standards, in comparison with the Kenyan national gender policy as a benchmark.

**Table 5**

Gender representation in management positions of the eight public universities.

University	Gender-specific Policy	Chancellor	Vice-Chancellor	Male Council	Female Council	% Female Council	Head of the Department
A	28%	Male	Male	7	2	22%	Male
B	22%	Female	Male	No council	No council	No council	Female
C	19%	Male	Female	4	3	43%	Female
D	9%	Female	Female	6	2	25%	Male
E	4%	Male	Male	7	2	22%	Female
F	No policy	Male	Female	7	2	22%	Male
G	Unknown	Male	Male	4	2	33%	Male
H	Unknown	Male	Male	-	-	-	Male

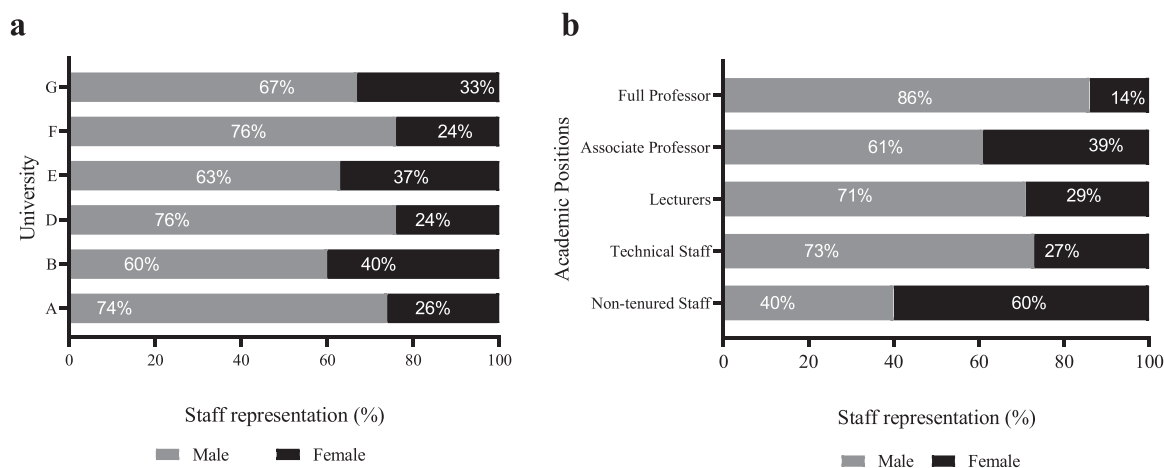
Note: Dash (-) shows not accessible.

policies regarding representation in the council. Indeed, the best gender equality policies were found in University A with 28%, while the University (C) with the third-ranked policy had the best female council representation at 43%. The second best performing University G (33%) either had no gender policy or it was not publicly available.

### 3.2.2. Representation of women staff in academic positions

Except for universities C and H, six public universities provided staff gender-disaggregated data. The highest total number of staff (women

and men) recorded was in university B with 31% (n = 57) and the lowest number in university G with 7% (n = 12) of the total number of staff (n = 181) obtained during the study. Overall, the universities' gender representation indicated that the percentage of men staff (68%) was twice as high as women staff (32%). Of the 32% women, the majority were recorded in university B comprising 40%, and the lowest percentage in universities D and F at 24% each (Fig. 2a). Similarly, gender disparities were revealed at five different university academic levels: non-tenured, technical staff, lecturer, associate professor and full



**Fig. 2.** Differences in staff representation by gender in selected universities and positions.

professor. These five positions were categorized as follows: Non-tenured position, which constitutes Assistant Lecturers, Tutorial Fellow and Teaching Assistants; Technical Staff position, which constitutes Laboratory technologists and Administrators; Lecturer position, which comprises of Senior lecturers and lecturers; Associate Professors and Full Professor. The highest percentage of females was recorded in non-tenured positions with 60%, and the lowest proportion at 12% in full professor positions (Fig. 2b).

Concerning the distribution of women and men staff, individual universities showed variations in staff distribution from non-tenured to permanent positions. Out of the six universities, only one university (B) had women and men in all of its five academic positions, although they were not equally represented. The remaining five universities lacked women in either one or more positions. The university with the highest proportion of women in lecturer positions was university E with 19%, and the lowest was University G, which had no women staff in permanent positions in the department (all were employed on a contract basis) (Fig. 3).

This data suggests that there was no relationship identified between gender equality of staff and the strength/presence of gender policies. For example, the highest proportion of women staff was found in University B, whose policy was ranked second, and the lowest female staff proportion was recorded in universities D and F at 24% each, showing the same performance despite university F having no policy.

### 3.3. Gender representation of students in ocean science disciplines

The Marine Resource Management course had the widest gender gap compared to the other courses (Fig. 4). The gender-disaggregated data obtained for students enrolled in ocean science courses shows that no course had equal or more female students than males. Female students were primarily concentrated in Marine Resource Management, followed by Applied Aquatic Science, and the lowest female representation was recorded in Fisheries and Oceanography courses.

#### 3.3.1. Enrolment and graduation trends of female students

**3.3.1.1. Enrolment of undergraduate students.** Overall average female student proportions in ocean science-related courses were low, although this varied between different years and universities. The academic year with the highest average proportion of women students (45%) was 2013 and the lowest (6%) was in 2018. However, there were considerable variations recorded in individual universities between years. There were also considerable variations between universities, as in Fig. 5. For instance, while University A varies between 30% and 60%, it had six out of ten academic years recording more females with a range between

49% and 57%. University E, on the other hand, had an average female enrolment below 30%, ranging between 17% and 33%. These results show a positive relationship between university gender equality policy and the number of females enrolled. A positive relationship was recorded in University A with the best gender policy, contrary to University E, which ranked fifth. The universities with no or unknown policies (F and G) showed large variations in female enrolment from one year to another (Fig. 5). The graphical presentation of the results excluded two years of the study, 2018 and 2019, when only one university enrolled students in ocean science-related courses. The low enrolment in these two years can be attributed to the strict regulations implemented by the Ministry of Education to curb exam cheating. These exam regulations led to a drop in the number of students who qualified for university entry, which affected the student populations in all the universities in Kenya, with most universities recording zero students in natural sciences, including ocean sciences.

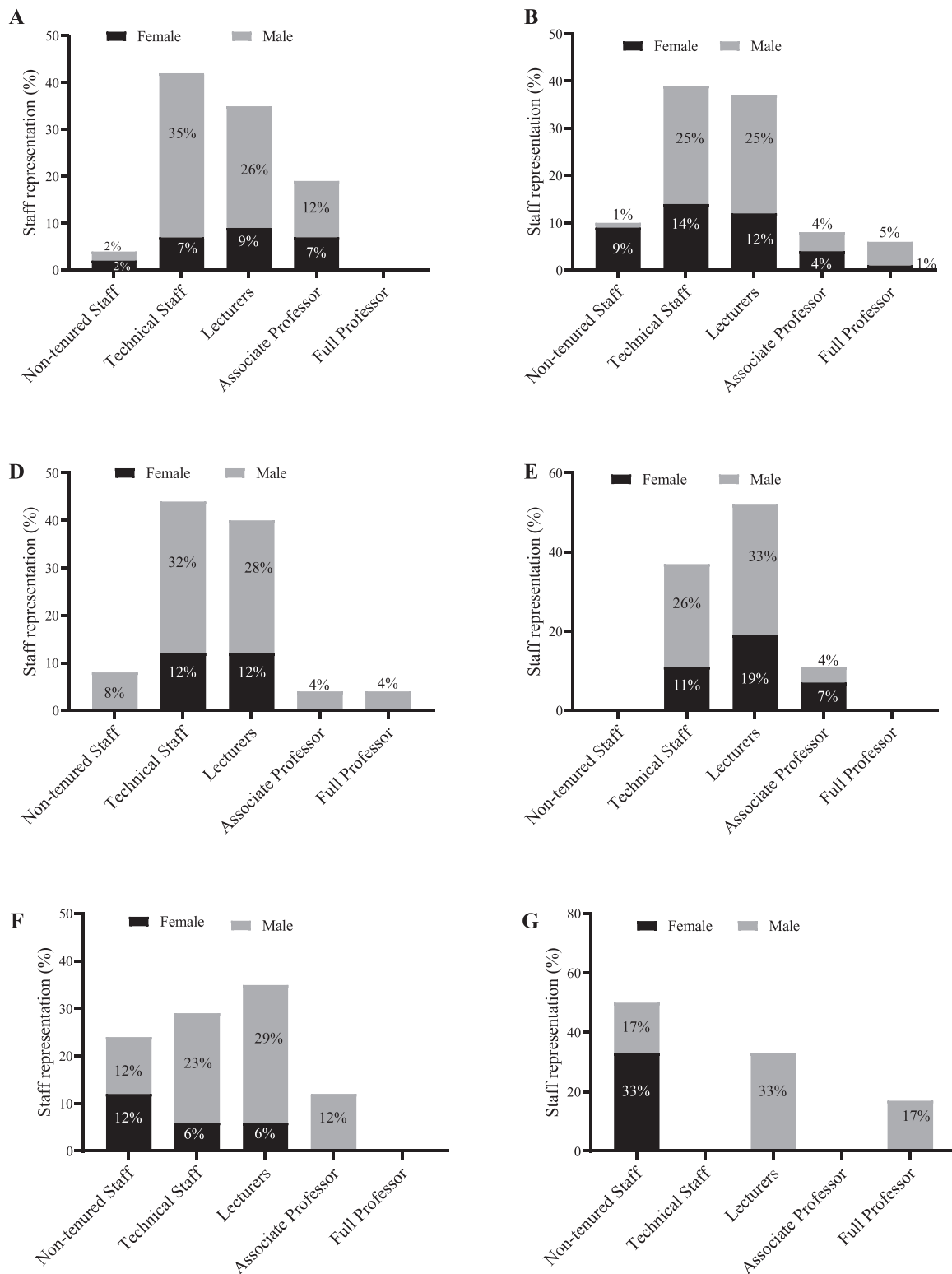
**3.3.1.2. Graduation rates.** The results indicate that fewer women graduate because their enrolment is lower than men. Out of the six universities included in this analysis, only University A was consistently closer to parity with an average of 49%. However, the completion rates of female students revealed that, proportionately, more females than males completed their higher education. For instance, in 2010, Universities D and E had 100% completion rates of female students while the male students' completion rates were 89% and 83%. The inconsistencies can be seen in Fig. 6.

**3.3.1.3. Enrolment of postgraduate students.** The enrolment of postgraduate (MSc and PhD) students, both female and male, was numerically low in the study period (2010–2019), with universities registering a range of one to five students for an MSc degree each year (on average three students per year). PhD students' enrolment was similarly low, where most universities, especially universities A and F, had no students enrolled in ocean science-related PhD programmes in the 10 years under study (Table 6).

## 4. Discussion

### 4.1. Policy evaluation

The first problem this study clearly exposed is that none of the gender policies had been reviewed in the time specified. There is a pressing need to review and update policies to ensure that they are aligned to the current strategies and relevant indicators both at national and institutional levels. The gender policy analysis performed by the GIC framework helped compare national and institutional policies and identify the



**Fig. 3.** Gender representation in five academic positions in six selected public universities (A, B, D, E, F and G, excluding C), No. of female staff = 58 and No. of male staff = 123 (Each graph adds to 100%).

most gender-sensitive policies. The National Gender Policy in Education [56] addresses gender disparities through six thematic areas: access; equity; quality of education; safety and gender-based violence; nurturing and mentoring; and governance and management, which were used to assess the universities' commitments to national recommendations. There were differences established between these policies

in that some of the university policies tended to be more transformative than others, especially in enhancing the participation of female staff and students. The GIC analysis revealed that most policy provisions were gender-neutral, with only a few being gender-specific such as the use of affirmative action and mentoring, both identified as necessary by Onsongo [53] and Onsare [50].

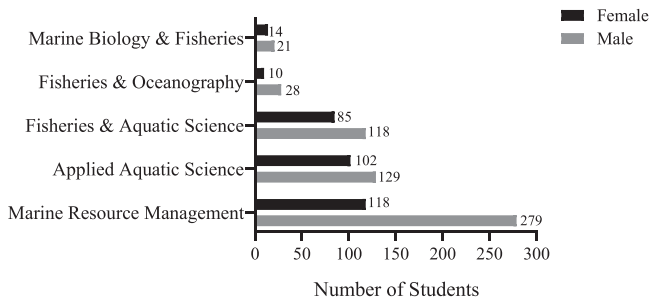


Fig. 4. Students in marine and aquatic courses offered in the selected public universities between 2010 and 2019 (n = 904).

The effectiveness of the institutional policies was evaluated using gender-disaggregated data of the staff and students collected from university registries at the departmental level. The results exposed the gender disparities in management, academic levels and student enrolment despite having gender policies, focal points, centres and institutes dealing with gender issues in all the universities.

4.2. Relationship between gender policies and female staff representation in management

Female representation in governance was relatively low in all the universities, and in some cases, there was not a single woman in a senior post. Nevertheless, some universities performed well, with women as Chancellor, Vice-Chancellor and departmental heads, and there was a considerable representation of women in two universities' councils.

However, the presence of women in management positions did not seem to influence the gender balance of staff appointments. Interestingly, the universities with better gender policies did not appear to perform any better on gender equality than those without policies. For example, University A had no women in three of its top management positions: Chancellor, Vice-chancellor and departmental head, and fewer females in the university council despite having the best gender policy. The underrepresentation arguably reflects a lack of implementation and enforcement of the existing policies to ensure equal recruitment and appointments of leadership positions at the university and the need for further exploration [62]. The council plays a crucial role in universities: employing staff, approving university policies, appointing executive board members and deciding who manages the university. Gender equal membership is fundamental for the fair selection and recruitment of staff at all levels and practical implementation of the policies. More interestingly, University G, which did not have its policy publicly available, did have a higher proportion of women in the council compared to others with policies, which warrants further investigation to explore the reasons behind this performance.

Even though this study found the representation of women in management positions to be generally low, there was an improvement compared to 2002, when no woman held a Vice Chancellor position [51], and only one woman was head of a science-related department. Amond [2] recorded similar findings in Kenya, with fewer women represented in top educational management positions (33.3%) than their male counterparts. Factors that these and other studies have argued hinder women's participation in senior positions included the criteria for appointing and recruiting staff, such as administrative experience; composition of committees responsible for appointments;

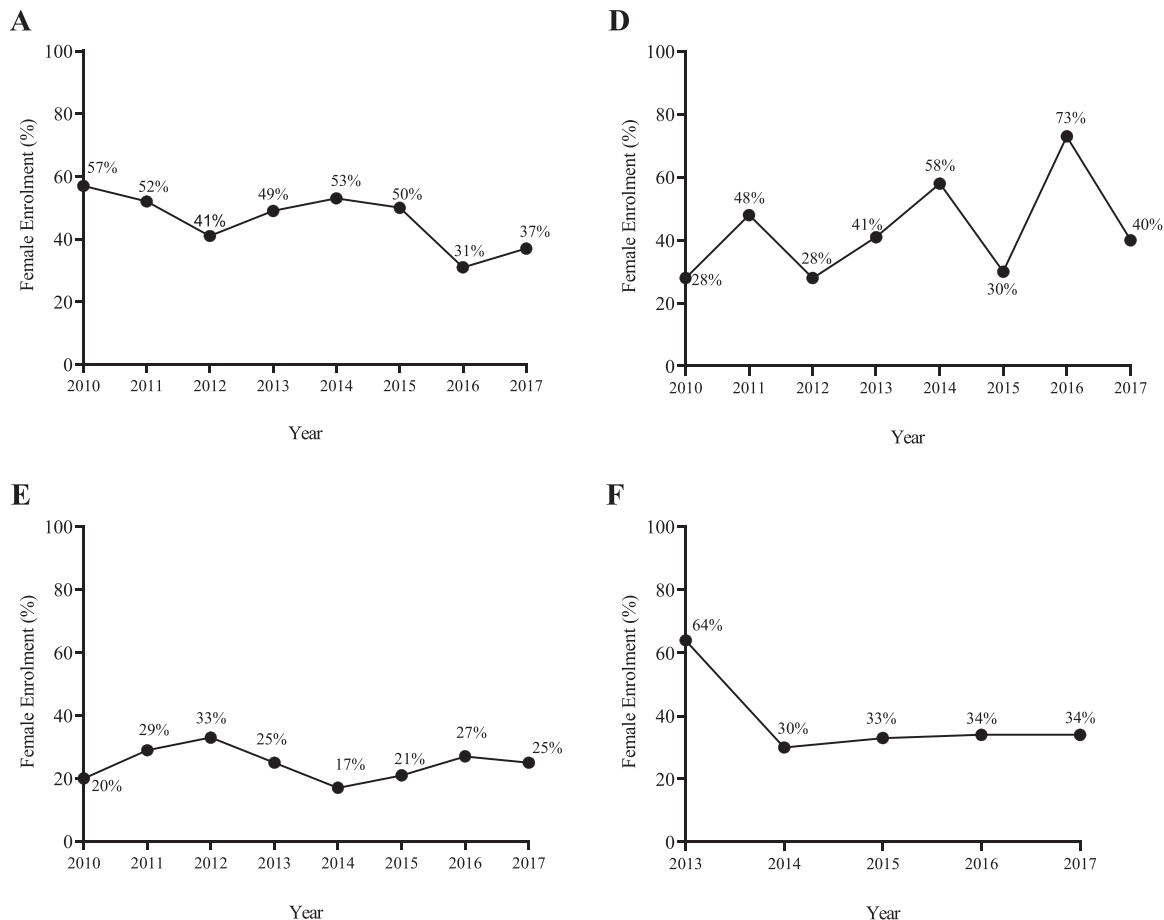


Fig. 5. Enrolment of undergraduate female students in the five selected public universities over time (University G was excluded from the graphical presentation because the data provided was incomplete).

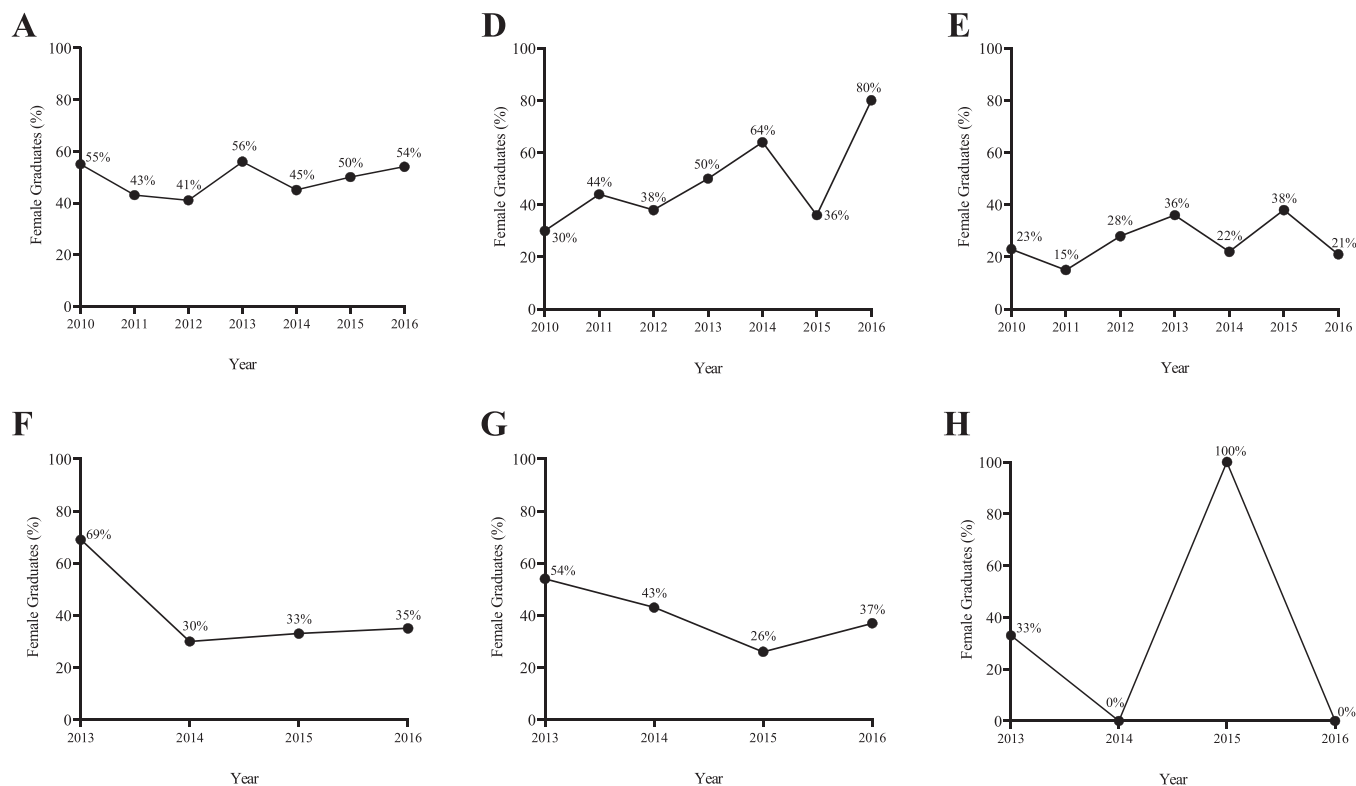


Fig. 6. Temporal variations of the graduated female students in the six public universities.

Table 6

Enrolment status of MSc and PhD students between 2010 and 2019 in public universities.

University	MSc Total students enrolled	MSc Female students enrolled (%)	PhD Total students enrolled	PhD Female students enrolled (%)
A	34	18%	0	0
B	13	31%	14	29%
D	21	57%	6	33%
E	8	25%	2	100%
F	6	50%	0	0
G	23	35%	1	100%
H	-	-	-	-

\*Note: Dash (-) shows no data provided.

and a predominantly patriarchal society with long-standing cultural beliefs that view women as incapable of holding public offices [12,20,47,51,55]. Onsongo noted that gender, networks, ethnicity and political affiliations also play a crucial role in Kenyan universities' recruitment and promotion process.

### 4.3. Relationship between gender policies and female academic staff representation

Recruitment and progression to different positions among academic staff depicted some gender gaps, with more women found in junior positions than senior ones. In this study, most women were in non-tenured and technical positions or part-time lecturers, tutorial fellows, teaching assistants and laboratory technicians/technologists. Again there were mismatches between the best policies and the proportions of women staff as shown in Universities A, D and E except University B, which had more women staff and the second-best gender policy.

According to this study, women still lag in almost all the essential fora in the universities. Similarly, a persistent low representation of women in various academic ranks was reported by Malelu et al. [36],

with 40% of Tutorial fellows, 35% of Lecturers, 32% of Associate Professors and 8% of Full professors between 1999 and 2013 in a Kenyan public university. These results conformed with those of Mukhwana et al. [46] who reported underrepresentation of women among academic staff in Kenyan universities.

Non-tenured positions often disadvantage women and exacerbate their level of vulnerability. According to the International Labour Organization [29], non-tenured forms of employment such as part-time contracts and casual employment opportunities are preferred as a matter of necessity by some women because of their benefits associated with flexible working hours. However, these kinds of jobs deepen the segmentation in the labour market. Besides, most part-time workers are often prone to job insecurity and inferiority and lack full access to social protection like healthcare, leave provisions and pension benefits [29]; [26,30,73]. Moreover, workers in this category often lack access to training opportunities and earn lower wages, placing them at higher risks of losing their jobs and falling into poverty. Therefore, legal and institutional frameworks for promoting gender equality in universities urgently need to prevent discrimination [68,78].

### 4.4. Relationship between gender policies and female student enrolment and graduation rates

On average, enrolment of female students in ocean science-related courses was found to be lower than the males in most universities with weak or no policies. There was a positive relationship between the best policy and the percentage of enrolled female students in University A, which had a consistent average enrolment of 49% over ten years. This showed consistencies with its policy provisions compared to other universities with low-ranked policies. This better performance can arguably be due to the effective implementation of the gender-specific provisions that promoted female access to higher education. Not all universities provided enrolment data; some universities took a long time to gather gender-disaggregated data suggesting poor or irregular record keeping. The transition from undergraduate to postgraduate studies was less than

10%, with female students recording the lowest proportion of students in master's and PhD degrees. This low transition rate can possibly be due to the lack of access to financial resources required to pay tuition fee and research; hence prefer studying abroad [15,27].

## 5. Conclusions

Sufficient data has been collected to establish that gender equality in ocean science and higher education in Kenya is problematic. Most of the public universities that participated in this research had gender policies, although these were outdated and had not been reviewed. Better gender policies did not necessarily translate to better gender balance, as evidenced by the consistent underrepresentation of women as students, academic staff and decision-makers over the years. Simply having gender policies is insufficient, but alignment to the national and international strategies, such as the UN Decade of Ocean Science for Sustainable Development, as well as monitoring and evaluation to facilitate a policy review process, may help improve the situation. Further research will be needed to understand the barriers hindering women's participation in ocean science in higher education. In particular, qualitative analysis will be needed to explore the reasons for the lack of progress on gender equality. It will be necessary to understand how institutional gender policies are understood and implemented (or not) and the experiences of women staff in ocean science and higher education in Kenya.

## Declaration of Competing Interest

None.

## Data availability

Data will be made available on request.

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