Occurrence of Research Misconduct and Institutional Capacity to Prevent and Manage Research Misconduct-Perspectives from Kenyan Research Regulators

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Abstract

Background

Research misconduct is often defined as fabrication, falsification and plagiarism. Its occurrence is associated with individual, institutional, national and global factors. Researcher perceptions of weak or non-existent institutional guidelines on prevention and management of research misconduct encourage these practices. Few countries in Africa have clear guidance on research misconduct. In Kenya, the capacity to prevent or manage research misconduct in academic and research institutions has not been assessed. The objective of this study was to explore the perceptions of Kenyan research regulators on the occurrence of and institutional capacity to prevent or manage research misconduct.

Methods

Key informant interviews with open-ended questions were conducted with 27 research regulators (chairs and secretaries of ethics committees, research directors of academic and research institutions, and national regulatory bodies). Among other questions to explore their perceptions on occurrence of research misconduct and existing institutional capacity to prevent or manage research misconduct, participants were asked: (1) *How common is research misconduct in your view?* (2) *Does your institution have capacity to prevent research misconduct?* (3) *Does your institution have capacity to manage research misconduct?* Their responses were audiotaped, transcribed and coded using NVivo software. Deductive coding covered predefined themes including occurrence, prevention detection, investigation and management of research misconduct and illustrative quotes were identified.

Results

Respondents perceived research misconduct to be very common among students. Their responses suggested there was no dedicated capacity to prevent or manage research misconduct at the institutional and national levels. The national research regulator had no specific guidelines on research misconduct. At the institutional level, the only capacity / efforts mentioned were directed at reducing, detecting and managing student plagiarism. There was no direct mention of capacity to manage fabrication and falsification or misconduct by non-student researchers.

Conclusions and Recommendations

Our respondents perceived research misconduct to be common mostly pointing to student plagiarism but not by non-student researchers. Additionally, fabrication and falsification were not mentioned among the concerns. We recommend development of Kenya guidelines, at national and institutional levels, on research misconduct in all its nuances, addressing all potential perpetrators and underpinned by relevant laws.

Introduction / Background

There is increasing interest in the integrity of the research record from conceptualization through implementation to dissemination and archiving. (1) Errant behaviors related to handling of the research record constituting research misconduct are receiving considerable attention in the global scientific community (2) (3). Misconduct including fabrication, falsification and plagiarism (FFPs) (4) (5) and also other questionable research practices (QRP) in design, analytic and publication practices (6) (7) have been recorded globally. Reports have mainly been from both high income countries such as United States of America and United Kingdom (8) but more recently also from lower and middle income countries such as Nigeria (9), Kenya (10), Middle Eastern countries such as Egypt, Lebanon, and Bahrain (11). A meta analysis of studies in the last decade estimates that 2.9% (95% CI 2.1–3.8%) report having committed at least 1 research misconduct and 12.5% (95% CI 10.5–14.7%) report having committed at least 1 QRP. In the same meta analysis, 15.5% (95% CI 12.4–19.2%) of researchers reported having witnessed others commit at least 1 misconduct and 39.7% (95% CI 35.6–44.0%) reported witnessing others commit at least 1 QRP. (12) Clearly research misconduct is not uncommon.

The immediate consequence of proven misconduct in published works is retraction from journal with its domino effects on all other works that cited the retracted literature (13). The impact on the global scientific enterprise includes wastage of scarce research dollars, loss of public trust on the research findings, and misinformed health policies that could be harmful to the public. (14) (15)
Studies report that RM is causally associated with several factors that can be categorized as individual, institutional, national and global factors\(^[[16][17][18]]\). At each level, there are factors that can enable or inhibit such deviant behavior. Individual motivators to engage in research misconduct thrive where the institutional and national structures to prevent, detect, deter and to sanction research misconduct are perceived to be either weak or non-existent\(^[[19][20]]\). The national ethic against corruption also forms part of the macro-environment within which research misconduct can occur. It is recognized that due to innate tendency to deviant behavior and need to secure tenure, promotion or fame and commercialization of research, some researchers will commit research misconduct\(^[[21][22]]\). To address the challenge posed by this small minority of researchers, institutions, national governments or ministries of higher education need to develop and disseminate research integrity oversight mechanisms and clearly defined sanctions for proven misconduct. National legal frameworks and institutional policies should underpin such research integrity oversight structures and the sanctions proposed therein\(^[[19]]\).

Generally, the institutional and national structures that deter commission of research misconduct are better developed in the HIC high income countries while studies show that in the low and middle income countries such structures are either weak or non-existent\(^[[23][24]]\).

In Africa, few countries and institutions have prioritized the development of structures to address the threat research misconduct poses to the scientific enterprise. Among the countries with such systems is South Africa.\(^[[25]]\) There is an emerging interest in setting up structures within the East African countries with Uganda and Kenya demonstrating early institutional efforts to address research misconduct\(^[[26]]\). There is also an African regional effort under the aegis of African Research Integrity Network (ARIN) to create awareness on research integrity. A paper by one of the founders of ARIN outlines the challenges associated with research misconduct in Africa and how institutions and governments in the region could address the problem\(^[[19]]\).

In this paper we report findings of engagement with Kenyan ethics committee leaders, top institutional managers and leaders at the national research regulatory bodies to explore their perceptions of the current state of institutional and national capacity to prevent, detect, investigate and sanction research misconduct.

### Methods

#### Study design

This cross sectional exploratory qualitative study was part of a three-phase project to develop capacity of Moi University to prevent and manage research misconduct. This study sought to document perceptions on occurrence of research misconduct from the perspective of the researchers,\(^[[10]]\) ethics committees, leadership of academic and research institutions and national regulatory bodies, hereafter referred to collectively as **research regulators**. In depth interviews were conducted among research regulators (as described under the section on Study Population) to assess the occurrence of research misconduct and the capacity to prevent and manage research misconduct in Kenyan institutions. The study was done between June and December 2018.

#### Study Setting

In Kenya, research is regulated by the National Commission for Science Technology and Innovation (NACOSTI) under the Science Technology and Innovation Act No. 28 of 2013 revised 2014.\(^[[27]]\) This law allows the NACOSTI to accredit institutional research ethics committees to review research under delegated mandate. The ethics committees make annual reports to NACOSTI and the accreditation is reviewed every 3 years. Ethics committees and an Expert Committee on Clinical Trials of the Pharmacy and Poisons Board of Kenya sequentially review clinical trials. NACOSTI also has a National Scientific and bioEthics Committee (NSEC) that resolves any review challenges from accredited institutional ethics committees. At the time of the study, Kenya had 28 universities and research institutions with accredited institutional research ethics committees.

#### Study Sample

Our study population consisted of 17 human subject administrators, secretaries and the chairpersons of Kenyan RECs, five corresponding officials of the National Scientific and bioEthics Committee of the National Commission for Science Technology and Innovation (NACOSTI), Kenya and the Pharmacy and Poisons Board of Kenya and a purposive sample of five research directors from participating research and academic institutions. The study engaged a convenience sample of people holding these positions in the various RECs who were willing to consent to participate - a total of 27 research regulators.

**Interview process**

**Research Team**
One colleague, RA, a qualitative research expert with doctorate in Social Sciences and well versed with both research ethics and qualitative research methods led the data collection exercise. The qualitative expert worked with a team of three research assistants) all with Masters level qualification and previous experience conducting qualitative interviews. Research Assistants underwent a 3-day training on the purpose of the study and study tool.

Recruitment of study participants

At the time of the study, there were 28 research ethics committees, and 2 national regulators. Due to the relatively small numbers of these clusters, we targeted recruitment of two participants from each of the 30 institutions (28 institutional ethics committees, the National Scientific and Bioethics Committee and Pharmacy and Poisons Board). Letters were sent to potential participants to inform them about the study in general and invited them to participate. Through telephone calls, the study coordinator made individual appointments for the face-to-face interviews at the convenience of each specific participant and the appointments were then shared with the qualitative research expert who was in charge of the data collection. Obtaining an appointment with the higher-level respondents was challenging and required multiple requests and reappointments. Due to lack of interest in participating, non-availability and scheduling challenges, we succeeded in interviewing a total of 27 respondents drawn from 17 academic, 5 research institutions and the 2 national research regulators.

Data collection

An interview guide with open-ended questions and probes was used to collect data. It was developed specifically for the study but with themes derived from the Research Misconduct Questionnaire-Revised (RMQ-R)(28), a widely used validated tool. The interview tool is attached as Appendix 1, and additionally, main questions asked during the interview are highlighted in the Results section. All the interviews were conducted in English, audiotaped and field notes also made. To start off the interview, all respondents were provided with a working definition of research misconduct as “deliberate fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results”. Interviews then focused on the participant’s perceptions on occurrence of research misconduct; the current capacity to prevent, detect and manage alleged research misconduct; and facilitators and barriers to managing research misconduct in Kenya’s institutions conducting research, as a priori themes.

All consenting participants went through with the interviews to the end. Majority of the interviews were carried out at the workplaces of the participants but where privacy could not be assured, the interviews happened in nearby hotels. The interviews lasted between 18 and 76 minutes. The wide range in the duration of interviews was as a result of the differences in participants’ experiences with, and knowledge of research misconduct noted in the institutions they represented. Consequently, participants with wider experiences and knowledge shared more during the interviews. To ensure data saturation, we ensured that we collected information representative of the range of experiences and perspectives relevant to the research question. We also had a minimum of 5 participants per category of respondents, and they provided meaningful information on the topic of interest (17 human subject administrators, secretaries and the chairpersons of Kenyan RECs; 5 from national research regulators; and 5 research directors from research and academic institutions). No repeat interviews were done and neither were transcripts shared with respondents for comment.

Data Management and analysis

The research assistants transcribed the audio-recordings verbatim into word documents. The qualitative expert then reviewed a random sample of the transcriptions for completeness and accuracy. All transcripts were then uploaded to NVivo version 10 for coding. A codebook was developed based on the a priori topic areas emanating from the study tool. The researchers and the research assistants then reviewed the codebook and incorporated their input into the final codebook used to code all the study transcripts. Field notes as relevant augmented the data from the transcripts. All coded data was then categorized into thematic areas in line with the study objectives: occurrence, prevention detection, investigation and management of research misconduct. The demographic characteristics of the respondents were summarized using descriptive statistics. Illustrative quotes were also identified and presented with relevant themes.

Reflexivity

Two issues may have influenced our review and interpretation of the interview transcripts. First, all the authors are employees of one of the academic institutions from where some of the respondents were purposively sampled. The authors are themselves researchers in this academic setting and are therefore quite conversant with the structures and capabilities there in. This lived experience likely influenced our interpretation and the thematic emphasis in the analysis of the transcripts. Secondly, three of the authors (EW, VN, and CK) are also long serving members of the local institutional research ethics committee and one author is a member of the NSEC (VN). These members have dealt with cases of suspected and confirmed cases of research misconduct. In fact, it is this cumulative experience working in research ethics committee that led to the project that is partially described in this paper and whose goal was to develop capacity to prevent or
manage research misconduct. Again this exposure may have influenced our perspectives in interpreting and drawing conclusions from the transcripts.

## Results

We present the findings of the qualitative survey on 27 respondents. The characteristics and professional affiliations are summarized in Table 1.

**Table 1: Respondent characteristics (N=27)**

<table>
<thead>
<tr>
<th>Category</th>
<th>Sub-category</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work place</td>
<td>Research Ethics Committee (REC)</td>
<td>17</td>
<td>63%</td>
</tr>
<tr>
<td></td>
<td>Institutional leads (Research Directors) (IL)</td>
<td>5</td>
<td>18.5%</td>
</tr>
<tr>
<td></td>
<td>National regulator (NR)</td>
<td>5</td>
<td>18.5%</td>
</tr>
<tr>
<td>Position</td>
<td>Chairman-Research Ethics Committee (REC)</td>
<td>6</td>
<td>22.2%</td>
</tr>
<tr>
<td></td>
<td>Research Director (DIR)</td>
<td>7</td>
<td>25.9%</td>
</tr>
<tr>
<td></td>
<td>Human Subject Administrator (HSA)</td>
<td>5</td>
<td>18.5%</td>
</tr>
<tr>
<td></td>
<td>Research Scientist</td>
<td>3</td>
<td>11.1%</td>
</tr>
<tr>
<td></td>
<td>Secretary of REC</td>
<td>2</td>
<td>7.4%</td>
</tr>
<tr>
<td></td>
<td>Principal Science Secretary</td>
<td>1</td>
<td>3.7%</td>
</tr>
<tr>
<td></td>
<td>Member of REC</td>
<td>3</td>
<td>11.1%</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>10</td>
<td>37%</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>17</td>
<td>63%</td>
</tr>
<tr>
<td>Employment Duration</td>
<td>Up to 5 years</td>
<td>15</td>
<td>55.6%</td>
</tr>
<tr>
<td></td>
<td>5 – 10 years</td>
<td>6</td>
<td>22.2%</td>
</tr>
<tr>
<td></td>
<td>&gt;10 years</td>
<td>6</td>
<td>22.2%</td>
</tr>
</tbody>
</table>

We carried out 27 key informant interviews with 17 officials of research ethics committees, five academic or research institutional leads and five officials from the national research regulatory institutions. Together, the respondents were officials of the RECs including the chairs, secretaries, human participant administrators and a few members of RECs constituted 63% of the respondents. Institutional leads were mostly research directors. A research scientist and a principal secretary represented the national regulators. Majority (63%) of the respondents were female. Nearly 56% of the respondents had been in their positions for up to 5 years with remaining 12 distributed equally between 5 – 10 years and over 10 years in the position.

### Occurrence of Research Misconduct

To assess the occurrence of research misconduct, respondents were asked: “*How common is research misconduct in your view?*” All participants agreed that research misconduct was more rampant in academic institutions than research institutions. Research institutions mentioned having experienced at least 1 to 5 cases of research misconduct, whereas in academic institutions the occurrence of research misconduct was perceived as "*very common*" by 5 of 27 respondents, *common* by 7/27 respondents and *uncommon* by 7 of 27 respondents. No direct answer could be discerned from the responses of 8 of 27 respondents. Generally, research misconduct was perceived to be fairly common among students and it was largely attributed to lack of knowledge on research integrity.

*I would say probably fifty-fifty based on what I have been exposed to (REC 17).*

*I would give you eight (REC 11)*

### Current Institutional Capacity to Prevent Research Misconduct

To assess the current institutional capacity to Prevent research misconduct, respondents were asked: “Does your institution have capacity to Prevent research misconduct?” Respondents described the capacities they perceived to exist in their institutions without providing direct answers to the question.

The existing institutional capacity to prevent research misconduct included: creating awareness through seminars & presentations; provision of guidelines and strict supervision of students as described by some of the participants.

Actually, last year, we did at least two seminars on ethics, the importance of ethics, the importance to adhere to them (REC 10).

…because the students are under strict tutelage of their supervisors, and the supervisors from the graduate school, they try their very best to ensure that data coming through, is not false (IL 2)

Capacity to Detect Research Misconduct

First, the institutions depend on peer review of proposals by scientific committees. This happens mainly in research centers but institutions of higher learning also have similar structures. After the internal scientific peer review, proposals are sent for research ethics review where there is an additional opportunity for the reviewer to raise red flags if they detect any signs of plagiarism. In institutions of higher learning use of external examiners for theses proposals also provides another layer of review where instances of plagiarism can be detected. Some institutions depend on free online plagiarism detection software but most do not have custom made proprietary software such as Turn-it-InR or I ThenticateR for deliberate plagiarisms scan. Sometimes, the system gets information from a whistleblower but again the process is not formalized. These processes mainly target students. Detection of fabrication and falsification inevitably falls under the prepublication peer review system that is usually remote from institutions of higher learning or research centers (Table 2).

Table 2: Current Institutional Capacity to Detect Research Misconduct (N=27)

<table>
<thead>
<tr>
<th>Type of Misconduct potentially addressed</th>
<th>Capacity</th>
<th>Illustrative Quotes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plagiarism</td>
<td>Use of anti-plagiarism software</td>
<td>We have a licensed [plagiarism] software but I don't know which one they use. But we are required to provide the CDs to any student who will present her thesis or proposals. So, they must submit alongside a hard copy, a CD containing a softcopy of actually what this is and then we ran through that software (REC8)</td>
</tr>
<tr>
<td></td>
<td>Free online plagiarism software</td>
<td>We just use this online, free online [plagiarism] software. It helps, it helps to some extent (REC7)</td>
</tr>
<tr>
<td></td>
<td>External examiners</td>
<td>When we detected a plagiarism not through our own effort but through the efforts of the, the external examiner... The external examiner gave us a copy of the cases it was plagiarized from (REC3).</td>
</tr>
<tr>
<td>Potentially Fabrication, Falsification and Plagiarism (though not explicitly mentioned by respondents)</td>
<td>Reviewers</td>
<td>...and sometimes, people can review and, in the event, in the process of reviewing, note issues of misconduct (REC7)</td>
</tr>
<tr>
<td></td>
<td>Whistle blowers</td>
<td>Other times when people bring in their studies, we will have probably a whistle blower, calling the secretariat to inform the secretariat about certain aspects that are not really, basically about a study that are not right (REC7)</td>
</tr>
<tr>
<td></td>
<td>Center Scientific Committee</td>
<td>Every center has a center scientific committee.... center the proposal has to be approved there. Then they have to be able to give the information to that center on a monthly basis of the progress (IL1)</td>
</tr>
</tbody>
</table>

Capacity to investigate alleged Research Misconduct

Existing practices include site visits by RECs to interrogate or observe the field research activities to confirm that research is implemented per approved protocol. Where there is substantive allegation, some institutions have a committee chaired by the deputy vice chancellor for academics who interrogates the allegation (Table 3).

Table 3: Current Institutional Capacity to Investigate Research Misconduct (N=27)

The respondents were asked: “Does your institution have capacity to Investigate Research Misconduct?”
<table>
<thead>
<tr>
<th>Type of Misconduct potentially addressed</th>
<th>Capacity</th>
<th>Illustrative Quotes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fabrication, Falsification &amp; Questionable Research Practices</td>
<td>Site visits</td>
<td>We have had such...questionable research practices. We have had an experience where the subcommittee of research actually had to do a site visit (REC7)</td>
</tr>
<tr>
<td>Auditing</td>
<td></td>
<td>There was one suspected case and we even sent an auditor...but it was confirmed we were wrong (IL1)</td>
</tr>
<tr>
<td>Plagiarism</td>
<td>Discussion to identify the level</td>
<td>...what we do is basic..., the first thing is;, we discuss and we see the level ...of plagiarism, then we give, we do a report (REC10)</td>
</tr>
<tr>
<td>Fabrication, Falsification &amp; Plagiarism</td>
<td>Committee meetings</td>
<td>I know they constitute a committee which I think is chaired by the deputy vice chancellor in charge of academics but that is all I know but I would imagine that the institutions have strategies for investigations (REC8)</td>
</tr>
<tr>
<td></td>
<td>Existence of Research Misconduct committee</td>
<td>The subcommittee on research misconduct is in existence (REC7)</td>
</tr>
<tr>
<td>Fabrication Falsification</td>
<td>Interrogation</td>
<td>We must try to visit that study, to interrogate it and just see what is going on. (REC3)</td>
</tr>
<tr>
<td></td>
<td>Site visits</td>
<td>Recently we have people who go out to the field, to the actual place that data is being collected...and actually seeing that data is being collected in a manner that is said to be collected (IL1)</td>
</tr>
</tbody>
</table>

**Capacity to Manage Research Misconduct**

Regarding institutional capacity to manage Research Misconduct, respondents were asked: “Does your institution have capacity to Manage Research Misconduct?”

Overall, respondents mainly from RECs gave an array of actions commonly taken in cases of research misconduct, specifically, student-plagiarized work. The actions ranged from cautioning and correcting the student and asking them to redo the work, to stopping research and even shredding data already collected. In some circumstances of serious misconduct, student disqualification may be recommended. Additionally, one respondent indicated that cases of research misconduct were escalated or reported to the national research regulator NACOSTI (Table 4).

**Table 4: Current Institutional Capacity to Manage Research Misconduct (N= 27)**
### Type of Misconduct Potentially Addressed

<table>
<thead>
<tr>
<th>Type of Misconduct Potentially Addressed</th>
<th>Capacity</th>
<th>Illustrative Quotes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questionable Research Practices</td>
<td>Shredding of data</td>
<td>Someone sneaked critical data before obtaining approval and actually started using it... The proposal was shredded (REC7)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>We recommended that all the collected data be discarded, and that [the investigator] starts fresh data collection. (REC11)</td>
</tr>
<tr>
<td>Suspension of study</td>
<td></td>
<td>So, we had to stop the study and they had to follow the due process. So, we cancelled everything and for that time we had to summon the people to the administration (REC13)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>We recommended the termination of the study, it was not a permanent termination, it was temporary pause (REC11)</td>
</tr>
</tbody>
</table>

| Giving advice                           |           | If it does not then we give appropriate advice (REC3) |

| Plagiarism                              | Corrections done | Usually what happens in some case of misconduct when we have students who [have] probably plagiarized, and in the process, a reviewer notices at the first stage of reviewer, the initial thing is for the reviewer to ask if this can be changed? It is not escalated (REC7), and with major changes probably, of course we return back, the researcher has to work on it again then go through the process once more (REC10), ... so for us if we note [plagiarism] we always ask the researcher to redo their work. (REC13) |
|                                         |             | You find that quite a number of the reviews they usually go back to being worked on again because of that particular issue(REC14) |

| Rejecting proposals                     | Proposal that was plagiarized. What did you do...? We rejected and pointed out (REC6) |

| Disqualification of students            | Because if is reported [to the institutional leadership].... then the student will be disqualified (IL2) |

| Fabrication, Falsification & Plagiarism | Referrals to NACOSTI | If there are issues with misconduct, they are escalated to NACOSTI. (REC7) |

| Terminating the study                   | If the adverse report warrants terminating the study then we terminate it (REC3) |

### Challenges to Management of alleged Research Misconduct

**Respondents were asked:** “What are the barriers to management of alleged research misconduct in your institution?”

Challenges mentioned could be broadly categorized into societal, national, institutional and individual challenges. The categories are however interrelated. A culture of not following laws or guidelines was identified as an important societal barrier to management of alleged research misconduct. At the national level, the lack of national legal framework that defines research misconduct and provides guidelines for academic and research institutions on prevention or management of misconduct was considered a barrier. Majority of barriers were institutional including: inadequate financial support for research ethics, inadequate personnel for structures such as ethics committees as well as supervisors and reviewers of student research. Another area was the lack of related guidelines and the dissemination to inform both students and supervisors of expectations. To detect plagiarism, for example, there are dedicated software such as Turn-it-in or iThenticate but these were rarely available in the academic institutions. The academic institutions also do not have any peer forum for exchanging views on research misconduct and how to manage it. The challenges of patchy capacity and lack of a common database of all past works in the various universities against which plagiarism checks can be carried out were also mentioned. At the individual level, barriers included individual laxity and failure to optimally use structures available in addition to lack of commitment to quality research work especially through diligent guidance and supervision of students (Table 5).
Table 5: Challenges in Managing Research Misconduct (N= 27)

<table>
<thead>
<tr>
<th>Level of Barrier</th>
<th>Barrier mentioned</th>
<th>Illustrative Quote</th>
</tr>
</thead>
<tbody>
<tr>
<td>Societal</td>
<td>Culture</td>
<td>We have a culture of not keeping the laws...not following laws, guidelines (REC17)</td>
</tr>
<tr>
<td>National</td>
<td>Lack of national policy</td>
<td>... I tell you something? At the national level. We don't have research policy (NR 3)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unfortunately, that is where we are - we do not have (NR 2)</td>
</tr>
<tr>
<td>Institutional</td>
<td>Financial constraints</td>
<td>But because of some constraints...Financial, availability of these people, it sometimes hinders (REC7)</td>
</tr>
<tr>
<td></td>
<td>Inadequate personnel</td>
<td>Different researchers can be supervised by different, you can't supervise any ...you supervise the ones that suit you in your field. What you understand better. And that has become a challenge because like in the medical field, we have few people with, who have the capacity to... (REC10)</td>
</tr>
<tr>
<td></td>
<td>Lack of professional body</td>
<td>We do not have a body that looks at science; we have NACOSTI [the national research regulator] there but is not a good body for the scientist, for example like we have a professional body for other institutions.... I know they look at ethics, I know they make sure that you are qualified before they give you a license but in terms of professional things like we have for medical doctors, lawyers, they can look at some of areas there because that would be handled by such bodies. (IL1)</td>
</tr>
<tr>
<td></td>
<td>Lack of anti-plagiarism software</td>
<td>I think one of our challenges is that we do not have the proper software to like Turn it In...(REC7), It [plagiarism scans] is coming up [but] it has not picked up. We are now aware of Turn-it-in and among other soft wares that can help detect (REC10)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>My observation is that there has been a lot of plagiarism. [but] since we don't have anti...(stammers) plagiarism device (REC6)[we miss it]</td>
</tr>
<tr>
<td></td>
<td>Receiving hard copy proposals</td>
<td>There is no copy that you send in soft. So, with hard copy you can't detect (REC10)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Currently we do hard copies so it is very hard for us to do the track and say this is... a replica of the previous work that was done by so and so. But hard copies now it is very hard for us to detect plagiarism unless we use our memories (REC11)</td>
</tr>
<tr>
<td></td>
<td>Too much work</td>
<td>The barrier, sometimes is, I have a lot for me on, on the table. This is not what I do I am also, a student also (REC10)</td>
</tr>
<tr>
<td></td>
<td>Minimal support from the University</td>
<td>So sometimes support from the university is so minimal to support research. Sometimes when you talk about the issues of ethics somebody may just think you want to get money or misuse money or ... (REC10)</td>
</tr>
<tr>
<td></td>
<td>Lack of common platform within universities</td>
<td>...because if people are using the same platform, it will be easy for me to know this work had been approved by [XX ethics committee] or had been rejected by [the same committee]......But, unfortunately the universities have not agreed on a common platform (REC3)</td>
</tr>
<tr>
<td></td>
<td>Lack of motivation</td>
<td>But now, motivation, the motivation is not there (REC 10)</td>
</tr>
<tr>
<td></td>
<td>Insufficient information</td>
<td>People need to be informed. About and be taught well about what a research is. So once people are aware that this is research, this is the work of IRECs in the country and this is the mandate of IRECs and this far is where IRECs can go beyond which NACOSTI needs to take over (REC13)</td>
</tr>
<tr>
<td></td>
<td>Repository not optimally used</td>
<td>But you see, yes like now we have a repository [of past research work]... but not all the theses are going there (REC3)</td>
</tr>
<tr>
<td>Individual</td>
<td>Lack of commitment</td>
<td>[lack of ] commitment by people concerned (REC10)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>But then, if you look at it [student research work] there are [are] gaping issues and you are like somebody else went through it for you, you just become a rubber stamping IREC (REC13)</td>
</tr>
<tr>
<td></td>
<td>Laxity</td>
<td>And [workers are] relaxed, just very laid back don't want to follow rules because it is acceptable, (REC17)</td>
</tr>
</tbody>
</table>

Discussion
In this exploratory qualitative survey involving research regulators including research ethics committee members, research directors in academic and research institutions and national research regulators in Kenya, the 27 respondents perceived research misconduct to occur commonly. This is consistent with the literature on research misconduct that reports occurrence of research misconduct reported by 68% respondents in the same study population, 68% in Nigeria, and 2–14% globally, all of which are considered underestimates.

In this study, respondent perceptions were that there was poor and uncoordinated institutional capacity to prevent and manage research misconduct in research and academic institutions. Additionally, responses suggested that the existing efforts or capacity identified predominantly targeted plagiarism by students.

Institutions should have well disseminated mechanisms to address the prevention and management of research misconduct. Such mechanisms should be underpinned by relevant national guidelines and legal framework. Compared to these expectations, some respondents in our study reported activities to promote research ethics, but such activities were irregular, uncoordinated and uncommon. Some institutions reported using normal human resource policy to inform the investigation and resolution of allegations of research misconduct. Such human resource policies are often general and not designed to manage the complexities of research misconduct allegations. At the national level, the national regulator did not have any structures or guidance on how to handle alleged research misconduct. Given the background of fairly common occurrence of research misconduct in low and middle income economies, our findings are concerning.

Studies have categorized the factors associated with commission of research misconduct into individual, institutional, national and global factors. Researchers tend to commit research misconduct where they perceive institutional capacity to be weak or nonexistent.

In our study, we provided the participants with the definition of research misconduct as: “as deliberate fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results.” Studies have shown that in the continuum of research practices from good science through sloppy science to research misconduct, there are behaviors considered to be questionable research practices (QRPs). QRPs include authorship malpractices, self-plagiarism, salami slicing and p hacking or rounding off p-values to make them appear significant, selective reporting of data to conform to what is expected. QRPs are not as serious as research misconduct but are far more common. Respondents in our study discussed prevention and management of research misconduct with focus mostly on plagiarism. Falsification and fabrication of research data or even QRPs were hardly ever mentioned as specific misconduct. In fact, all responses referred to addressing plagiarism. Plagiarism can be detected through use of specific plagiarism detecting software. Our respondents reported that only a few of the institutions, both academic and research, had subscribed to these software and required students or faculty researchers to provide similarity indices for their works before academic assessment or peer review, respectively. Identification of falsification and fabrication of research data requires much greater sophistication in terms of critical appraisal of the scientific literature and being alert to subtle discrepancies that raise red flags about possibility of misconduct. Detection or suspicion of fabrication and falsification also require a strong culture of responsible conduct of research (RCR) among members of research teams as well as structures for researchers to be able to report any suspicious behavior for requisite intervention. It also requires robust internal and external peer review processes before and after submission of a paper to the journals to be able to pick out falsification and or fabrication of data. More recently, there is a move towards Open Science whereby study protocols including analysis plan are published ahead of study documentation and once the data collection and cleaning is completed, data is locked and made available publicly, allowing other scientists to scrutinize the data whenever queries on research outcomes arise. This concept was adopted and incorporated into the Hong Kong Principles on rewarding researchers. None of our respondents mentioned any of these structures or capacities as existing in the Kenyan institutions represented although peer review mechanisms were mentioned in relation to detection of plagiarism. Existing structures to foster research integrity need to be widely disseminated. In fact, such awareness creation is considered part of the effort to prevent research misconduct and also foster a culture of research integrity. No respondents mentioned such activities as part of the structure and processes to prevent research misconduct in their institutions.

The other finding of concern from our study was the perception that research misconduct prevention and management were relevant only to students. Almost all the responses suggested that the structures to prevent and or manage research misconduct were directed at preventing student plagiarism. It is true that efforts at creating awareness on research integrity directed at students can lead to a culture of RCR and avoidance of research misconduct. This happens through training on research ethics, ethical acquisition of scientific data, data management and analysis, ethical publication behavior and being mentored in these arts by more experienced research scientist. Additionally, students need to be trained to understand the impact of QRPs and research misconduct on the scientific enterprise and to be able to contribute to management of alleged research misconduct by reporting such behavior to appropriate authorities (whistle blow) for investigation and remedial action. In this manner, students develop their own habit of RCR and contribute to the management of research misconduct. However, all this training and acculturation of the students may not be possible if the trainers or mentors are
themselves unaware of or do not subscribe to the same principles of research integrity and, worse, if they do not perceive themselves to be subject to the rules and guidelines for prevention of research misconduct. Moreover, faculty are at higher risk of succumbing to individual factors associated commission of research misconduct or QRPs including pressure to publish for promotion.(20) In this respect, therefore, this finding is quite concerning and points to an awareness and capacity gap.

Among the capabilities mentioned by respondents was the role of RECs to identify cases of research misconduct. RECs, also called institutional review boards (IRBs), have the core mandate of promoting and safeguarding the welfare and safety of research participants. Additionally, RECs are mandated to monitor the conduct of approved research to ensure adherence to approved protocols(19). While many RECs achieve their first mandate quite satisfactorily, the second is more challenging and is generally poorly achieved across many RECs due to lack of capacity especially where many research proposals are reviewed and approved.(36) (37) (38) RECs, therefore, depend on well-trained researchers to report protocol violations or deviations and also promptly report incidences such as serious adverse experiences that may jeopardize participant safety or wellbeing. In short, RECs depend on the researchers to adhere to principles of RCR. It is a collegial collaboration with investigators for the safety and wellbeing of research participants. On the other hand, when a researcher commits research misconduct, a deliberate subversion of the principles of RCR, the processing of allegations of misconduct is a quasi-legal and adversarial proceeding that appears to be outside the mandate and capacity of a REC. In the US, therefore, while RECs/IRBs may have a role in promoting RCR and, in whistleblowing in cases of alleged research misconduct, the task of managing research misconduct is the mandate of a research integrity oversight office that is designed and empowered to carry out adversarial proceedings for any alleged case of research misconduct.(39) (40) (41) A perception that RECs/IRBs can be depended on for management of cases of alleged misconduct therefore appears misinformed.

**Study strengths and Limitations**

To our knowledge this exploratory qualitative survey is the first of its kind to assess the perceived capacity existing within Kenyan research and higher education institutions to prevent and or manage research misconduct. The respondents were leaders of active research ethics committees, high-level officials of the research and academic institutions as well as the national regulator of research and innovation in Kenya. The study had two important limitations. The first limitation was that at the time of the interview, respondents appeared to have varying definitions of research misconduct. During the interview, some respondents appeared to confuse research misconduct with the much broader concept of academic misconduct. To achieve consensus, the definition of research misconduct was provided to the respondents. It is possible that the variance in definition had an effect in the respondents’ views on the scope of research misconduct. The study was however limited in as far as it did not have the opportunity to explore definitions or even the respondents’ knowledge of research misconduct in depth. The second limitation was that responses were based on individual observations and perceptions and may not be necessarily accurate descriptions of the situation on the ground.

**Conclusion**

We conclude that the respondents perceived research misconduct to be common particularly among students. There was no discernible dedicated capacity to prevent and or manage research misconduct in the research and academic institutions. Additionally, there was a perception that national guidelines on research misconduct were non-existent. Most of the institutional efforts were directed at preventing student plagiarism. Existing efforts mentioned did not specifically include other types of misconduct such as fabrication and falsification or even QRPs or misconduct involving non-student researchers.

We recommend the development of Kenya national guidelines for the prevention and management of all forms of research misconduct at all career levels.

**Abbreviations**

ARIN- African Research Integrity Network

DIR – Director

FFP-Fabrication, Falsification & Plagiarism

HIC- High Income Countries

HSA- Human Subject Administrator

LMIC-Lower Middle Income Countries
Declarations

Ethics and consent to participate

The overall project was reviewed and approved by the Moi Teaching and Referral Hospital/Moi University Institutional Research Ethics Committee (MTRH/MU IREC) – IREC No FAN: IREC 1973 and the National Commission for Sciences Technology and Innovation (NACOSTI P/18/67049/24696). All respondents provided written consent before commencing the interviews. Prior to the interview, participants were informed of the purpose of the study including the audio recording of the interviews. Participants were informed that the information provided would be de-identified and confidentiality maintained. Participants were also informed that during reporting, quotes would be used without linkage to their names. The opinions and positions expressed by the respondents were also considered as personal opinions and not necessarily the positions of their committees or institutions /organizations.

Consent for Publication

Nothing relevant to declare.

Competing Interest

Three authors are all active members of the Moi Teaching and Referral Hospital / Moi University Institutional Research and Ethics Committee. Otherwise we had no conflict of interest.

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Author Contribution

EW, JK conceptualized the paper and developed the first draft. RA and EK led data collection, management and analysis. EW, JK, and VN reviewed and edited the first draft. All authors approve the submission of this manuscript.

Data Availability

Raw data has been provided to the editors and reviewer during peer review.

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Appendices

Appendices 1-3 are not available with this version