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Knowledge and perception of bioethics among biomedical researchers in Osun State, Nigeria

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Abstract

This study investigated the knowledge and perceptions of bioethics among biomedical researchers in Osun State, Nigeria using a semi-structured self-administered questionnaire during a capacity workshop in November 2020. Demographic data, and attendee' awareness, knowledge, and perception on bioethics and need for ethical approvals for biomedical research were collated. Data was analyzed using descriptive statistics and expressed as frequencies and percentages. A total of 153 biomedical researchers comprising (58%) males, and (42%) females participated in this study. Majority of the participants (60.8%) hold academic positions and about one-third of the population were graduate students (30.1%). Awareness on bioethics was high (91.5%), and more common in schools (61.4%), with majority of the participants (77.1%) describing it as a field that addresses the social and legal issues arising from medicine and life sciences ($p<0.05$). However, there were considerable gaps in knowledge among participants in the students and academia category, with about 16% of participants considering none or only part of the principles while about 10% felt they could obtain ethical permits while research is ongoing or completed and only 13.7% affirmed that all biomedical related researches require ethical approval. This finding calls for the incorporation of bioethics module into the curriculum of graduate students. The use of online resources, short courses, workshops and seminars can also be explored for re-enforcing training even among non-school going researchers and professionals.

Keywords: Bioethics, Biomedical researchers, Knowledge and Perception, Nigeria

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INTRODUCTION

The word "Bioethics" was first coined by Fritz Jahr in 1927 and has gained considerable attention to date as it employs ethical theories derived from the considerations of philosophy, law and politics to address some of the problems encountered in the field of biology, including medicine (Gillon, 1998). Biomedical research or experiments targeted at advancing science and promoting societal development are expected to be performed according to established rules and standards (WHO, 2001). The 1947 Nuremberg Code and the 1964 Helsinki Declaration remained the point of reference for most ethical norms, which are implemented by ethics committees (EC) across various countries (WHO, 2002). EC are guided with the responsibility of ensuring biomedical research or otherwise are guided and performed by researchers according to set standards (WHO, 2002).

National law and regulations in several countries require mandatory review and approval of biomedical research before the commencement of research studies (Andanda *et al.,* 2011; Langlois, 2011). Unfortunately, the WHO Regional Committee for Africa in 2001 reported that some studies in the region were not undergoing any form of ethics review (Kirigia *et al.,* 2005). In addition, a common misconception about ethics is that ethical considerations are targeted at only ensuring research participants are protected from exploitation and other forms of harm. However, beyond the concept of protection, biomedical research or experiments should be guided by other principles of autonomy, non-maleficence, beneficence, and justice (Rai *et al*., 2015). It is therefore important to submit protocols to unaffiliated individuals for review, with the aim of ensuring the principles of ethics are met and methodologies outlined in the protocol is rigorous enough to produce valid and reliable results (Emanuel *et al*., 2000). Refusal to submit research protocols for ethics review during biomedical research or experiments does not only vitiate the validity of the research but also dent the integrity of the researcher. In addition, biomedical research that poses risk, un-beneficial or with doubt to participants, have the potentials to contribute to cohort fall-out, loss of public trust, and reduced community participation and engagement (Harkness *et al*., 2001; Ursin, 2010 Merslin and Garba, 2011). We hypothesize that a significant part of the problem is the lack of awareness about the importance of ethics review, as such it is imperative to consider investments that will encourage submissions of research protocols to EC for approvals, and ensure high ethical standards are maintained during investigations. However, the exponential growth in the numbers of biomedical researchers and the consequential increase in research activities in sub-Saharan Africa like most developing countries have not been complemented with capacity enhancement workshops on bioethics (Andanda *et al*., 2011: Gordijn, 2014; Blessing and Wassenaar, 2015). In South-west Nigeria, there is emerging evidence corroborating the lack of knowledge and practices of ethics among biomedical researchers (Ogunrin *et al.,* 2016). This knowledge gap suggests the need to invest in the training and re-training of biomedical researchers, either through the incorporation of a revised ethics module in the curriculum of students enrolled in tertiary education or through a more flexible medium such as seminars or short courses approach for other non-enrolled students and career researchers.

To this end, a one-day workshop on bioethics for biomedical researchers in Nigeria was organized by Osun State University in partnership with the Global Health Network (TGHN), University of Oxford to stimulate and promote the need for healthy research culture while ensuring ethical standards and procedures are met. This study then investigated the knowledge and perceptions of participants at the workshop before the workshop facilitators began their

presentations with the aim of profiling gaps in knowledge, perceptions and practices about bioethics.

MATERIALS AND METHODS

Planning and preparatory activities

This study was conducted in Osun State University, Osogbo during a one-day workshop on "Ethics in Biomedical Research and global best practices in the context of Preventive Chemotherapy Neglected Tropical Diseases (PC-NTDs) Elimination strategy in Nigeria" organized by the Department of Zoology, November 2020. The workshop was advertised via the web (email, Twitter, WhatsApp and Facebook) and other professional societies platforms. Participant were invited to register before the workshop. A total of 247 persons registered after the initial call for application. The applications were screened to select those whose interest align with the theme of the workshop. A total of 191 in the field of biology or biomedical sciences were finally invited to participate in the workshop. Out of this, only 184 persons attended the event and 153 consented to participate in the study.

Ethics approval and consent to participate

This study received ethical approval from the Ethics Review Committees of the Department of Zoology, Faculty of Basic and Applied Sciences, Osun State University and the Institutional Review Board of the Osun State University, Osogbo, Nigeria (UNIOSUNHREC/2020/001) Those who agreed to participate were given informed consent forms to complete after the purpose of the study had been explained to them. Formal consent was obtained through a duly completed consent form with the name and signature of the attendee. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Questionnaire administration

The study was cross-sectional in design and involved the administration of already pretested semi-structured questionnaires to collect quantitative data from consenting participants. The invitation to participate in the study was conducted at the registration desk, which is the first point of contact for all attendees of the workshop. As such, all attendees were invited to participate, after explaining the objective of the study to them. Those who agreed to participate signed an informed consent form, and completed a hard-copy self-administered questionnaire afterwards. The process of completing a questionnaire took less than 5 miutes, and after submitting a completed questionnaire, the participants proceeded into the event hall. Two independent registration desks, with two administrative members who were not part of the researcher manned the registration unit including the invitation to participate in the research. Information such as participants' demographic data, and their knowledge and perception about bioethics were assessed using the questionnaires. In order to prevent event-induced responses and biases as a result of the presentations from resource persons during the workshop, consenting participants completed the questionnaires before proceeding with registration or gaining access to the event hall.

Data analysis
Data obtained were entered into Microsoft Excel 2019 software. Quantitative data (responses from both closed and open questions) were summarized and analysed using descriptive statistics in SPSS. 20.0 and expressed as frequencies and percentages. Cross-tabulations and Chi-square analysis were performed to investigate associations. The confidence interval was set at 95%.

RESULTS

Demographic characteristics of study participants
A total of 153 participants consented to the study procedures and participated in the study. By gender, majority of the participants were 89 males (58%), and 64 females (42%). The age of the participants ranges from 20 to 60 years, and those aged 36 and above were in abundance, 72 (47.1%), followed by those between 26 and 35 years with 58 (37.1%) and the least number of participants were those below the age of 25 years with 23 (15.0%). By occupation, majority of the participants hold academic positions in tertiary institutions (60.8%), followed by students representing one-third of the population (30.1%) and the least were clinicians (1.3%) (Table 1).
The participants who were drawn from thirty-three (33) academic institutions across Nigeria responded to the questionnaire. The research scope of the participants ranged from basic science to molecular biology.

Table 1: Demographic information of study participants

	Number of respondents (n= 153)	Percentage
Gender		
Female	64	41.8
Male	89	58.2
Age (in years)		
18-25	23	15.0
26-35	58	37.9
≥36	72	47.1
Occupation		
Academia/Lecturer	93	60.8
Clinician	2	1.3
Government worker	12	7.8
Students	46	30.1

Participants' awareness and knowledge about bioethics
Majority of the participants, 140 (91.5%) have heard of bioethics. The clinicians have heard of bioethics prior the workshop 2 (100%), and 44 (96%) of the students who participated were aware of bioethics, followed by participants, 86 (93%) who hold academic positions in tertiary institutions. There were significant differences in the proportions of participants who were aware of bioethics prior to the workshop across the occupational status ($p < 0.05$). Majority of the participants 94 (61.4%) affirmed they learnt about bioethics while in schools, this was more common for the students 34 (74%), followed by civil servants 7 (58.3%) and those in academics 53 (57%). An appreciable number of participants 19 (12.4%) also affirmed that they learnt about bioethics on institutional review boards. The civil servants affirmed this in high proportions 4 (33.3%) compared to those in the academia 15 (16.1%). The internet and advert of the event also

contributed to awareness creation for 17 (11.1%) and 10 (6.5%) of the participants respectively. However, only 2.0% of the participants affirmed that they learnt about bioethics on a radio program. There were significant differences in the proportions of where participants learnt about bioethics across the occupational status ($p < 0.05$). Majority of the participants 118 (77.1%) ascribed the description of bioethics to social and legal issues arising from medicine and the life sciences, this was followed by 25 (16.3%) who described it as human understanding of well-being and about 10 (6.5%) felt it is a critic reflection about ethical conflicts. There was no significant difference in the proportions of participants across the descriptions of bioethics and their occupational status ($p > 0.05$) (Table 2).

Table 2: Participants' awareness and knowledge about bioethics

	Occupation of study participants					X^2, df, p-value
	Clinician	Academia	Civil servant	Student/ unemployed	Total	
Have you heard about bioethics before this event?						
Yes	2(100)	86(92.5)	8(66.7)	44(95.7)	140(91.5)	10.828, 3, 0.013
No	0(0)	7(7.5)	4(33.3)	2(4.3)	13(8.5)	
Total	2(1.3)	93(60.8)	12(7.8)	46(30.1)	153(100)	
Where did you first learn about bioethics?						
Institutional review boards	0(0)	15(16.1)	4(33.3)	0(0)	19(12.4)	76.889, 18, 0.000
Internet	0(0)	10(10.8)	1(8.3)	6(13.0)	17(11.1)	
National ethics board	0(0)	0(0)	0(0)	4(8.7)	4(2.6)	
Schools	0(0)	53(57)	7(58.3)	34(73.9)	94(61.4)	
Radio program	0(0)	3(3.2)	0(0)	0(0)	3(2.0)	
Hospital/clinics	2(100)	4(4.3)	0(0)	0(0)	6(3.9)	
Event advert	0(0)	8(8.6)	0(0)	2(4.4)	10(6.5)	
Total	2(1.3)	93(60.8)	12(7.8)	46(30.1)	153(100)	
Which of the following best describes bioethics						
Critic reflection about ethical conflicts	0	3(3.2)	1(8.3)	6(13.0)	10(6.5)	9.526, 9, 0.390
Human understanding of well-being	0	16(17.2)	4(33.3)	5(10.9)	25(16.3)	
Social and Legal issues arising from medicine and the life sciences	2(100)	74(79.6)	7(58.3)	35(76.1)	118(77.1)	
Total	2(1.3)	93(60.8)	12(7.8)	46(30.1)	153(100)	

Participants' perception about bioethics and ethical approvals

Majority of the participants 140 (91.5%) perceived it is necessary to obtain ethical approval before the study, with the highest proportion of responses recorded among clinicians 2 (100%), followed by those holding academic positions 88 (94.6%), students 41 (89.1%) and civil servants 9 (75%). About 25% of the participants that were civil servants felt they could still obtain ethical permits during the study process, and some students 2 (4.4%) and academic staff 2 (2.2%) felt they can obtain a permit after the study. There was no significant difference in the proportions of participants across the time when approval should be sought and their occupational status ($p > 0.05$) (Table 3).

Furthermore, the perception of participants varied regarding the bioethics principles to be considered while planning for research. Majority of the participant 128 (83.6%) affirmed that issues surrounding the need for ethical approvals, respect for study participants, risk and benefits to study participants of the research should be considered. Clinicians and civil servants affirmed totally to this, with 2 (100%) and 12 (100%) respectively. However, some academic staff, 12 (12.9%) and students, 6 (13%) felt on the risk and benefits of the study to the participants should be considered. Also, 2 (2.2%) of the academic staff felt none of these principles should be considered. There was significant differences in the proportions of participants across their perceptions about bioethics principles and their occupational status ($p < 0.05$) (Table 3).

The perceptions of participants varied around the type of research that requires ethical approvals. Majority of the participants felt only clinical research 47 (30.7%) and animal experimental research 46 (30.1%) should apply for ethical approvals. This was followed by research involving collection of human bio-samples, 37 (24.3%) and the least was behavioral studies with 2 (1.3%). Only 21 (13.7%) affirmed that all these types of studies need ethical approval, with responses from those holding academic positions 19 (12.4%), civil servants 1 (8.3%) and students 1 (2.2%). There was no significant difference in the proportions of participants across their perceptions about the type of study that requires ethical permits and their occupational status ($p > 0.05$). Majority of the respondents, 144 (94.1%) agreed that a manuscript can be rejected if the underlying study has no ethical approval. However, some academic staff 7 (7.5%) and students 9 (5.9%) felt such manuscripts can still be accepted. There were no significant difference in the proportions of participants across their occupational status ($p > 0.05$) (Table 3).

Table 3: Participants' perception about bioethics and ethical approvals

	Occupation of study participants					
	Clinician	Academia	Civil servant	Student/ unemployed	Total	X^2, df, p-value
When do you think it is necessary to obtain ethical clearance for your study?						
Before	2(100)	88(94.6)	9(75)	41(89.1)	140(91.5)	10.193, 6, 0.117
After	0(0)	2(2.2)	0(0)	2(4.4)	4(2.6)	
During	0(0)	3(3.2)	3(25)	3(6.5)	9(5.9)	
Total	2(1.3)	93(60.8)	12(7.8)	46(30.1)	153(100)	
Which of the following bioethics principle should be considered while planning for research?						
Justification to participants	0(0)	3(3.2)	0(0)	0(0)	3(2.0)	76.889, 18, 0.000
Respect for participants	0(0)	2(2.2)	0(0)	0(0)	2(1.3)	
Risk and benefits to the participants	0(0)	12(12.9)	0(0)	6(13)	18(11.8)	
All of the above	2(100)	74(79.5)	12(100)	40(87)	128(83.6)	
None of the above	0(0)	2(2.2)	0(0)	0(0)	2(1.3)	
Total	2(1.3)	93(60.8)	12(7.8)	46(30.1)	153(100)	

Which type of research do you need ethical clearance?						
Animal experimental research	2(100)	26(27.9)	6(50)	12(26.1)	46(30.1)	25.115, 12, 0.14
Behavioral studies	0(0)	0(0)	1(8.3)	1(2.2)	2(1.3)	
Clinical research	0(0)	24(25.8)	3(25)	20(43.4)	47(30.7)	
Human bio-samples	0(0)	24(25.8)	1(8.3)	12(26.1)	37(24.2)	
All of the above	0(0)	19(12.4)	1(8.3)	1(2.2)	21(13.7)	
Total	2(1.3)	93(60.8)	12(7.8)	46(30.1)	153(100)	
Do you think that a manuscript can be rejected due to a lack of proper ethical review?						
Yes	2(100)	86(92.5)	12(100)	44(95.7)	144(94.1)	1.525, 3, 0.677
No	0(0)	7(7.5)	0(0)	2(4.3)	9(5.9)	
Total	2(1.3)	93(60.8)	12(7.8)	46(30.1)	153(100)	

Participants' perception about capacity building in bioethics

Although majority of the participants 89 (58.2%) have had a need for bioethics certification before, about half, 64 (41.8%) of the participants have not had any need for bioethics certification before the event, with an appreciable number from civil servants 8 (66.7%), students 29 (63%) and those holding academic positions 27 (29%). There was significant a difference in the proportion of participants across their need for a bioethics certification and their occupational status ($p < 0.05$). Majority of the participants, 147 (96.1%) felt there should be regular mid-career training on bioethics for biomedical researchers, and 151 (98.7%) of them were willing to participate in future workshops (Table 4).

Table 4: Participants' perception about capacity building in bioethics

	Occupation of study participants					
	Clinician	Academia	Civil servant	Student/ unemployed	Total	X^2, df, p-value
Have you had a need for bioethics certification before?						
Yes	2(100)	66(71)	4(33.3)	17(37)	89(58.2)	19.248, 3, 0.000
No	0(0)	27(29)	8(66.7)	29(63)	64(41.8)	
Total	2(1.3)	93(60.8)	12(7.8)	46(30.1)	153(100)	
Do you think that there should be a regular mid-career training on bioethics?						
Yes	0(0)	92(98.9)	12(100)	43(93.5)	147(96.1)	52.315, 3, 0.000
No	2(100)	1(1.1)	0(0)	3(6.5)	6(3.9)	
Total	2(1.3)	93(60.8)	12(7.8)	46(30.1)	153(100)	
Will you wish to participate in future training on bioethics?						
Yes	2(100)	91(97.9)	12(100)	46(100)	151(98.7)	1.307, 3, 0.727
No	0(0)	2(2.1)	0(0)	0(0)	2(1.3)	
Total	2(1.3)	93(60.8)	12(7.8)	46(30.1)	153(100)	

DISCUSSION

This study investigated the knowledge and perceptions of biomedical researchers on bioethics, with the aim of profiling gaps in knowledge, perceptions and practices. Our findings contributes to the emerging shreds of evidence on poor knowledge and practices among biomedical researchers in the south-western part of Nigeria (Ogunrin *et al.,* 2016). The awareness about bioethics among the study participants was high, and expected since bioethics has gained popularity in academic environments where students and biomedical researchers are required to submit protocols for ethics approval before field or laboratory experiments. In addition, the popularity of bioethics in field of medicine is higher since the interactions with human subjects are more pronounced when compared to other biomedical disciplines. Our findings, therefore, show an increased awareness among the study participants on social and legal issues upon which the principles of bioethics are built. However, the assumption that awareness would translate to improved knowledge and practices is faulty, since the training process for bioethics among biomedical researchers is usually passive (Ogunrin *et al.,* 2013). This can be attributed to the fact that there is paucity of postgraduate programmes focusing on bioethics in Nigeria. As such, awareness creation and knowledge transfer occur subconsciously via interaction with advisors, institutional review boards, workshops or in some instances on the radio program as expressed by the participants of this study. The importance of open symposia, workshops and radio programmes as important advocacy media have been previously discussed (Advocacy Partnership, 2012; Mogaji *et al.,* 2021), and should also be considered in promoting awareness, improved knowledge and practices among biomedical researchers. However, these modes of knowledge transfer cannot provide exhaustive information on the background, principles of

bioethics and requirements for ethical approval within the short period of time stipulated for delivery (Xu *et al.,* 2020).

Furthermore, about 6% of the study participants believed that ethical approval for research protocols can be obtained while the experiment has started, and another 3% affirmed that approval can be obtained when the experiment has been completed. An appreciable number of participants also felt, only the risk and benefits of research should be taken seriously, while others felt none of the principles should be considered. These findings corroborate with the reports of Ogunrin *et al.*, (2016) and Ateudjieu *et al*., (2019), that only a few researchers are aware of ethical principles guiding the conduct of research. These observations reflect a gap in knowledge and in-depth understanding of bioethics and re-iterate the need to consider a more robust medium for training and/or re-training of biomedical researchers. Exhaustive information on the background, principles of bioethics and requirements for ethical approval should be prioritized in such proposed bioethics module (Xu *et al.,* 2020).

There were also discrepancies in the participants' view about the type of research that requires ethical approvals, with majority of the participants placing more importance on clinical and animal experimental studies, while neglecting behavioral studies. This perception might be influenced by the erroneous belief that ethical approvals are only associated with experimental studies, unlike research involving the use of questionnaires or interviews (Bowling, 2005). Researchers may therefore evade or refuse to seek ethical permissions before the commencement of their study and may do otherwise after or during the research to satisfy manuscript submission requirements as clearly expressed by some of the participants. It is therefore imperative that the proposed bioethics module should offer biomedical researchers the opportunity to learn the need for ethical approval and the range of research studies that require such approval in addition to the basic principles of bioethics. Such training should lead to certifications that should accompany protocols that are submitted for ethical approval (Yakubu and Adebamowo, 2012).

CONCLUSION

Although this study revealed high awareness about bioethics across the study participants, there were considerable gaps in knowledge among participants in the students and academia category. This calls for incorporation of bioethics module into the curriculum of graduate students. The use of online resources, short courses, workshops and seminars can be explored for re-enforcing training even among non-school going researchers and professionals. The prioritization of bioethics workshops and training across universities in Nigeria is highly recommended, and more detailed studies across institutions in Nigeria should be done to assess, monitor and improve the knowledge of biomedical researchers on research ethics. Initiatives to provide training grants for the development of robust bioethics programme in Nigeria, and other countries in Africa would be important in resolving some of the identified challenges. Finally, whenever resources permit, research oversight bodies might consider supervisory checks to approved biomedical studies, or request quarterly reports during the lifetime of the study as a way of ensuring that research studies that requires ethical clearance are conducted ethically. We consider the following as major limitations in the study. First, the workshop had a specific theme that related to Neglected Tropical Diseases Control, which might have impacted on the frame of participants who applied for the programme. Secondly, we did not capture the specific area of interest for each participant, as such we could not classify further which area of interest was well represented or not, and how this has influenced their responses. Thirdly, the event was organized

immediately after COVID-19 lockdown was eased, which might have impacted on the range (by discipline) and number of participants who attended, as they might be more cautious of COVID-19 pandemic.

Competing interests

The authors declare that they have no conflict of interest related to this work.

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