IMPLICATIONS OF HEALTH WORKERS' PRACTICES ON CLIMATE CHANGE RESILIENCE: A CASE STUDY IN KADUNA METROPOLIS

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ABSTRACT

Climate change is a significant threat to human health, and in response, the Nigerian government developed the National Climate Change Policy (NCCP) as a resilience measure. It is therefore crucial for healthcare workers to practice the NCCP to effectively apply the mitigation and adaptation strategies in the health sector, thereby protecting the public from the adverse effects of climate change on health. This study assessed the implications of health workers' practices on climate change resilience in Kaduna metropolis. Two research questions guided the study. Utilizing the Leslie Kish formula, a sample size of 160 was initially determined, which was increased to 179 for improved precision. A standardized questionnaire was administered to 185 health workers in government-owned secondary care facilities in Kaduna metropolis. The majority demonstrated poor practice in relation to NCCP, in the context of climate change resilience. Additionally, a statistically significant relationship ($p = 0.040$) was observed between practice of the NCCP and the age of respondents. The study concluded stressing a clear need to develop an action guide for health workers to delineate their roles in implementing the NCCP in Nigeria effectively. This would enhance their performance in taking climate change resilience measures, and in addressing climate change-related health challenges.

Keywords: Climate Change, National Climate Change Policy, Health Workers, Healthcare

Introduction

Climate Change is a major threat to human health and well-being (WHO, 2021). Intergovernmental Panel on Climate Change (IPCC) defines climate change generally as "any change in climate overtime whether due to natural variability or as a result of human activity" (Pielke, 2004).

Climate change presents a formidable threat to human health, necessitating comprehensive mitigation and adaptation strategies. The menace of climate change extends its reach into every aspect of human life, including the practices of healthcare workers whose roles are pivotal in mitigating its impacts on public health (Bates *et al*., 2015). As climate change exacerbates existing health challenges and introduces new threats, the need for robust strategies and practices within the healthcare sector becomes increasingly evident (Dupraz & Burnand, 2021).

Within the healthcare sector, health workers play pivotal roles in addressing climate-related health risks and fostering community resilience (Bates *et al*., 2015). Despite their central role, limited attention has been directed towards understanding the implications of health workers' practices on climate change resilience (Ogbonna, Otuu & Madueke, 2020).

In Nigeria, climate change exacerbates health vulnerabilities, magnifying risks of malnutrition, infectious diseases, and extreme weather events (Federal Ministry of Environment, 2021). Amidst these challenges, the National Climate Change

Policy (NCCP) serves as a foundational framework for mitigating impacts and fostering adaptation strategies (Federal Ministry of Environment, 2021).

Understanding the implications of health workers' practices on climate change resilience is paramount for enhancing healthcare systems' adaptive capacity and fostering community well-being. However, limited research has examined the implications of health workers' practices on climate change resilience, particularly in Kaduna Metropolis.

By elucidating the linkages between health worker behaviors and climate resilience, this research seeks to fill this gap by examining the practices of health workers in Kaduna Metropolis concerning climate change resilience. By assessing their current practices towards addressing climate-related health challenges, this study aims to inform targeted interventions that bolster climate resilience within healthcare settings. Through this investigation, we aim to empower health workers to effectively navigate the intersection of climate change and public health, ultimately contributing to improved health outcomes and enhanced resilience in the face of climate variability, and inform targeted interventions and policy recommendations to bolster climate resilience within healthcare settings.

Research Questions

iii. What is the level of practice of health workers in public hospitals in Kaduna metropolis regarding climate change mitigation and adaptation strategies?
iv. What is the practice of health workers in public hospitals in Kaduna metropolis towards the national climate change policy (in the context of climate change resilience) in Nigeria?

Method and Materials

Kaduna State occupies an area of approximately 48,473.2 square kilometers and has a population of more than 6 million (Folashade & Ismail, 2013). The State is divided into 23 local government areas. The metropolitan area consist of 4 local government areas, which include, Kaduna North, Kaduna South, Igabi and part of Chikun.

There is one tertiary and five secondary public hospitals in Kaduna Metropolis. All of the five secondary hospitals were included in this study. The secondary healthcare facilities are Yusuf Dantsoho Memorial Hospital, Tudun Wada, Gwamna Awan General Hospital, Kakuri, General Hospital, Kawo, General Hospital, Rigasa, General Hospital, Sabon Tasha.

This is a descriptive cross-sectional study of health workers working in government-owned secondary care facilities in Kaduna metropolis, Kaduna State, Nigeria.

The study instrument for this research was adapted from similar studies (UNDP, 2016), and pre-tested on nurses/midwives of the Adewole Primary Healthcare Center, Ilorin, Kwara State.

The questionnaire was divided into two sections: section A covered socio-demographic information, section B covered practices, and designed to assess the practices of health workers regarding the national climate change policy in Nigeria in the context of climate change resilience.

Four items assessed the practices of healthcare workers regarding the National Climate Change Policy. Three questions had options ‘Yes’ [1 point], ‘No’ [0 point] or ‘I don't know’ [0 point]. The remaining one question had mixtures of right and wrong answers. Right answers were scored [1] and wrong answer [0].

The practice score range from 0-4. A practice score of 0–1.99 was considered poor, and a practice score of 2–4 was regarded as good practice.

A sample size of 160 was determined using the Leslie Kish formula for estimating single proportions. This was however, increased to 179 respondents to increase the precision of the study.

Multistage sampling technique was used, and all the five secondary healthcare facilities with 1,273 health workers of different cadres were included in this study. Health workers across all categories were interviewed using the questionnaires, until a sample size of 179 was achieved.

Table 1: Categories, Departments and Number of Health Workers in each of the Sampled Secondary Public Hospitals in Kaduna Metropolis

Yusuf Dantsoho Memorial Hospital, Tudun Wada (YDMH), Dr. Gwamna Awan General Hospital, Kakuri (GAGH), General Hospital, Kawo (GHK), General Hospital, Rigasa (GHR), General Hospital, Sabon Tasha (GHS)

S/N	Category	YDMH	GAGH	GHK	GHR	GHS	**Total**
1	Medical Doctors	15	16	8	7	10	**56**
2	Laboratory Scientist	16	14	13	17	10	**70**
3	Radiographers	0	0	0	0	1	**1**
4	X-Ray Technicians	4	4	3	3	2	**16**
5	Pharmacists	8	7	5	5	6	**31**
6	Pharmacy Technicians	13	13	10	11	10	**57**
7	Nursing Staff	152	127	68	67	70	**484**
8	Health Management Information System Officers	24	21	13	13	12	**83**
9	Health Attendants	97	84	69	58	70	**378**
10	Community Health Officers	1	0	3	0	2	**6**
11	Environmental Health Officers	8	9	6	7	9	**39**
12	Nutritionists	6	2	4	6	0	**18**
13	Dental Therapists	9	8	5	3	4	**29**
14	Physiotherapists	1	1	1	1	1	**5**
	Total	**354**	**306**	**208**	**198**	**207**	**=1273**

Respondents were proportionately allocated to each of the hospitals from the total sample size of 179, using the formulas:

Population percentage = Study population for each hospital/Total study population x 100

Respondents = Proportion of the population percentage of each hospital from the sample size

Table 2: Shows the Study Population and Respondents in each of the Secondary Public Hospital in Kaduna Metropolis

Hospital	**Study Population**	**Respondents**
Yusuf Dantsoho Memorial Hospital (YDMH)	354	50
Dr. Gwamna Awan General Hospital (GAGH)	306	43
General Hospital, Kawo (GHK)	208	29
General Hospital, Rigasa (GHR)	198	28
General Hospital, Sabon Tasha (GHS)	207	29
Total	**1273**	**179**

Using controlled quota sampling, respondents were allocated to the different cadre of health workers in each of the five secondary public hospitals in Kaduna Metropolis.

Table 3: Shows the Respondents Allocated to each Category/Cadre of Health Workers in each Secondary Public Hospital in Kaduna Metropolis

S/N	Category	YDMH	GAGH	GHK	GHR	GHS	Total
1	Medical Doctors	2	2	2	1	1	**8**
2	Laboratory Technicians	2	2	2	2	2	**10**
3	Radiographers	0	0	0	0	1	**1**
4	X-Ray Technicians	1	1	0	0	0	**2**
5	Pharmacists	1	1	1	1	0	**4**
6	Pharmacy Technicians	2	2	2	1	1	**8**
7	Nursing Staff	20	16	10	11	11	**68**
8	Health Management Information System Officers	3	3	2	2	2	**12**
9	Health Attendants	14	13	6	9	9	**51**
10	Community Health Officers	1	0	1	0	0	**2**
11	Environmental Health Officers	1	1	1	1	1	**5**
12	Nutritionists	1	1	1	0	0	**3**
13	Dental Therapists	1	1	1	0	1	**4**
14	Physiotherapists	1	0	0	0	0	**1**
	Total	**50**	**43**	**29**	**28**	**29**	**=179**

Random sampling was used to select respondents from each of the category of health workers in each hospital, who were then administered questionnaires.

The data were summarized descriptively for the various categories of healthcare personnel included in this study. Data obtained was also analyzed inferentially using Statistical Package for Social Sciences (SPSS) version 20.

Results and Discussions

Table 4: Socio-Demographic Characteristics of the Study Participants (n=179)

Variables	Frequency	%
Age in years		
20-29	62	34.6
30-39	87	48.6
40-49	21	11.7
50-59	9	5.1
Sex		
Male	28	15.6
Female	151	84.4
Education Level		
Informal	5	2.8
Primary	21	11.7
Secondary	15	8.4
Tertiary	134	74.9
Postgraduate	4	2.2
Religion		
Islam	115	64.2
Christianity	64	35.8
Cadre		
Medical doctors	7	4
Nurses	62	34.6
Pharmacists	8	4.5
Lab. Technicians	9	5
Health Attendants	49	27.4
Community Health Officers	3	1.7
Environmental Health Officers	5	2.8
Health Information Management Officers	10	5.6
X-Ray Technicians	4	2.2
Nutritionists	4	2.2
Dental Therapists	5	2.8
Radiologists	4	2.2
Physiotherapists	5	2.8
Pharmacy Technicians	4	2.2
Work experience		
10 years and less	136	76
More than 10 years	43	24
Total	179	100%

A total of 200 potential respondents were approached, of whom 185 individuals completed the paper questionnaire (response rate of 92.5%). Of these, 6 responses did not include adequate socio-demographic details of the participants, and were excluded. In total, 179 responses were considered for data analysis.

Medical Doctors formed 4.4% of the respondents, Nurses/Midwives 38%, Pharmacists 2.4%, Health Attendants 29.7%, Health Management Information System Officers 6.5%, Community Health Officers 0.5%, Environmental Health Officers 3.1%, Nutritionists 1.4%, Dental Therapists 2.3%, Pharmacy Technicians 4.5%, and X-Ray Technicians 1.2%. All sampled healthcare workers were from secondary public hospitals.

The average age of the participants was 39.8 years. 84.4% were female and 15.6% were male. Educational status and years of experience also varied widely between the subgroups. Socio-demographic characteristics of the participants are summarized in Table 4.

Table 5: Practice Grade

Variable	Frequency	%
Practice		
Good practice	19	10.6
Poor practice	160	89.4
Total	179	100

Practices Related to the National Climate Change Policy, in the context of Climate Change Resilience

Majority of the respondents (90%) have not taken any measures to support the national climate change policy in Nigeria. Over half of them (50.8%) claim to not have enough information about climate change, while 24% are of the opinion that it is not their responsibility to take action. A high rate of involvement in activities related to climate change mitigation and adaptation was also noticed among Environmental Health Workers (Table 10).

Table 10: Practices of Respondents Related to National Climate Change Policy (NCCP) in Nigeria (n=179)

Variables	Practice	
	Good Frequency (%)	Poor Frequency (%)
Age in years		
20-29	1(1.6)	61(98.4)
30-39	9(10.3)	78(89.7)
40-49	7(33.3)	14(66.7)
50-59	2(22.2)	7(77.8)
Sex		
Male	5(17.9)	23(82.1)
Female	14(9.3)	137(90.7)
Education level		
Informal	0	5(100)
Primary	0	21(100)
Secondary	0	15(100)
Tertiary	18(13.4)	116(86.6)
Postgraduate	1(25)	3(75)
Religion		
Islam	16(13.9)	99(86.1)
Christianity	3(4.7)	61(95.3)
Cadre		
Medical doctors	1(14.3)	6(85.7)
Nurses	6(9.7)	56(90.3)
Pharmacists	2(25)	6(75)
Lab. Technicians	2(22.2)	7(77.8)
Health Attendants	0	49(100)
Community Health Officers	1(33.3)	2(66.7)
Environmental Health	3(60)	2(40)

Officers		
Health Information Management Officers	1(10)	9(90)
X-Ray Technicians	0	4(100)
Nutritionists	1(25)	3(75)
Dental Therapists	1(20)	4(80)
Radiologists	1(25)	3(75)
Physiotherapists	0	5(100)
Pharmacy Technicians	0	4(100)
Work experience		
10 years and less	14(10.3)	122(89.7)
More than 10 years	5(11.6)	38(88.4)

Variable	**Frequency**	**%**
Have you taken any action to support the National Climate Change Policy?		
Yes	18	10.1
No	155	86.6
Don't Know	6	3.4
Have you received any training or education on the National Climate Change Policy in Nigeria?		
Yes	9	5
No	170	95
Don't Know		
Have you taken any measure to mitigate, adapt and lessen the impact of climate change?		
Yes	28	15.6
No	141	78.8
Don't Know	10	5.6
If you have not taken any action, what has prevented you from taking action to prevent or lessen the impact of climate change on your community?		
Do not have enough information about climate change.	91	50.8
Not aware of what actions can/should be taken.	29	16.2
Climate change is not a concern in the community.	6	3.4
It is not my responsibility to take action.	43	24
Other	1	0.6

Table 11: Practice Grade

Variable	Frequency	%
Practice		
Good practice	19	10.6
Poor practice	160	89.4

Majority (89.4%) of the respondents had poor practice of the Nigeria National Climate Change Policy, while only 10.6% had good practice.

4.2 Factors Associated with Practice of the National Climate Change Policy

Table 24: Relationship Between Practice of National Climate Change Policy (NCCP) and Age of the Respondents among Health Workers in Kaduna Metropolis (n=179)

Variable	Practice		Test Statistic	*P*-Value
	Good Frequency (%)	Poor Frequency (%)		
Age in years			Fisher's Exact Test = 43.819	$P = 0.040$
20-29	1(1.6)	61(98.4)		
30-39	9(10.3)	78(89.7)		
40-49	7(33.3)	14(66.7)		
50-59	2(22.2)	7(77.8)		

Majority of the respondents had poor practice of the National Climate Change Policy, with health workers aged 20 - 29 years having the highest proportion of people (98.4%) with poor practice. The relationship was statistically significant.

Table 12: Relationship Between Practice of National Climate Change Policy (NCCP) and Sex of the Respondents among Health Workers in Kaduna Metropolis (n=179)

Variable	Practice		Test Statistic	*P*-Value
	Good Frequency (%)	Poor Frequency (%)		
Sex			Chi-Square = 1.835[a] df = 1	$P = 0.176$
Male	5(17.9)	23(82.1)		
Female	14(9.3)	137(90.7)		

Majority of the male and female respondents had poor practice of the National Climate Change Policy, with female health workers having the highest proportion of people (90.7%) with poor practice. The relationship was however not statistically significant.

Table 13: Relationship Between Practice of National Climate Change Policy (NCCP) and Education Level of the Respondents among Health Workers in Kaduna Metropolis (n=179)

Variable	Practice			
	Good Frequency (%)	Poor Frequency (%)	Test Statistic	*P*-Value
Education level			Fisher's Exact Test = 6.157	*P* = 0.143
Informal	0	5(100)		
Primary	0	21(100)		
Secondary	0	15(100)		
Tertiary	18(13.4)	116(86.6)		
Postgraduate	1(25)	3(75)		

Majority of the respondents across all educational level had poor practice of the National Climate Change Policy, with health workers at tertiary and postgraduate levels having 13.4% and 25% respectively, of people with good practice. The relationship was however not statistically significant.

Table 14: Relationship Between Practice of National Climate Change Policy (NCCP) and Religion of the Respondents among Health Workers in Kaduna Metropolis (n=179)

Variable	Practice			
	Good Frequency (%)	Poor Frequency (%)	Test Statistic	*P*-Value
Religion			Chi-Square = 3.688[a] df = 1	*P* = 0.055
Islam	16(13.9)	99(86.1)		
Christianity	3(4.7)	61(95.3)		

Majority of the respondents across all religion had poor practice of the National Climate Change Policy, with Christian health workers having the highest proportion of people (95.3%) with poor practice. The relationship was however not statistically significant.

Table 15: Relationship Between Practice of National Climate Change Policy (NCCP) and Cadre of the Respondents among Health Workers in Kaduna Metropolis (n=179)

Variable	Practice			
	Good Frequency (%)	Poor Frequency (%)	Test Statistic	*P*-Value
Cadre			Fisher's Exact Test = 26.594	*P* = 0.012
Medical doctors	1(14.3)	6(85.7)		
Nurses	6(9.7)	56(90.3)		
Pharmacists	2(25)	6(75)		
Lab. Technicians	2(22.2)	7(77.8)		
Health Attendants	0	49(100)		

Community Health Officers	1(33.3)	2(66.7)
Environmental Health Officers	3(60)	2(40)
Health Information Management Officers	1(10)	9(90)
X-Ray Technicians	0	4(100)
Nutritionists	1(25)	3(75)
Dental Therapists	1(20)	4(80)
Radiologists	1(25)	3(75)
Physiotherapists	0	5(100)
Pharmacy Technicians	0	4(100)

Majority of the respondents across all cadres had poor practice of the National Climate Change Policy, with environmental health officers having the highest proportion of people (60%) with good practice. The relationship was statistically significant.

Table 16: Relationship Between Practice of National Climate Change Policy (NCCP) and Work Experience of the Respondents among Health Workers in Kaduna Metropolis (n=179)

Variable	**Practice**			
	Good Frequency (%)	**Poor Frequency (%)**	**Test Statistic**	***P*-Value**
Work experience			Chi-Square = 0.061[a]	*P* = 0.805
10 years and less	14(10.3)	122(89.7)	df = 1	
More than 10 years	5(11.6)	38(88.4)		

Majority of the respondents regardless of years of work experience, had poor practice of the National Climate Change Policy. The relationship was however not statistically significant.

Discussion

The National Climate Change Policy (NCCP) holds immense significance in steering Nigeria's response to the challenges posed by climate change. However, its effectiveness rests on the practices of various stakeholders, including healthcare professionals who wield considerable influence in shaping community health behaviors (WHO, 2008).

This study marks a pioneering effort, addressing the dearth of literature on Nigerian health workers' practices of the NCCP in the context of climate change resilience.

The majority of health workers were not engaged in any specific activities to address climate change. However, they expressed willingness to learn more about the national climate change policy in Nigeria and how to integrate it into their work.

While many health workers demonstrated poor practice of climate change resilience actions, majority believed it is because they do not have access to enough information about climate change, while some others believed it is not their responsibility to take action.

However, a multinational study among health professionals reported that 86% respondents felt that health professionals have a responsibility to bring the health effects of climate change to the attention of the public (Vishvaja, 2022).

Similar finding was also reported in a study conducted at Yale University, USA where nearly 90% of health professionals agreed that they have responsibility to conserve resources and prevent pollution in their workplace (Vishvaja, 2022). These results are encouraging, as it shows that the health sector has the potential to participate in addressing climate change and its health effects.

Insights from the study indicated a poor baseline practice among health workers regarding the NCCP, in the context of climate change resilience. There's an urgent need to bridge the information gap and enhance awareness of climate change mitigation and adaptation practices. Equally pressing is the imperative to devise tailored programs enabling health workers to seamlessly integrate the NCCP into their professional duties.

These findings echo broader trends observed in studies among health workers globally, highlighting a pervasive lack of awareness regarding the health ramifications of climate change and the requisite capacity to address them effectively.

The findings of this study are consistent with another study conducted among health workers in relation to climate change. For example, a study conducted among public health nurses found that although most of the respondents had good knowledge of the basic concepts of climate change, and about 50% of them agreed that it is the duty of their healthcare division to address the health impacts of climate change, less than 40% believed that their actions could lead to an actual decrease in the adverse effects of climate change (Polivka, Chaudry, & Mac, 2012). In the study, majority of the respondents suggested that their division did not have the capacity or were not prepared to address the health-related impacts of climate change (Polivka, Chaudry, & Mac, 2012).

Similarly, according to a study assessing the preparedness and perception of local public health department directors in the United States regarding climate change, more than 40% of the respondents believe that community stakeholders, including workers in their health departments, lack the necessary climate change knowledge and required expertise to plan and execute effective mitigation or adaptation strategies (Maibach *et al*., 2008).

Majority of the respondents showed poor practice in relation to the NCCP in Nigeria. 86.6% of the study participants responded ‘No’ to the question “have you taken any action to support the National Climate Change Policy?” Most of them also have not taken any measure to mitigate, adapt and lessen the impact of climate change (84.4%). Some blamed this on not having enough information about climate change (50.8%), some on not being aware of what actions can/should be taken (16.2%) and some, especially Health Attendants (51%) believed that it is not their responsibility to take action (24%).

Previous studies show that most public health officers feel ill-equipped and unprepared in terms of information, training, and resources to mitigate the threat (Bedsworth, 2009). They also feel the need for additional funding, staffing and training to aid proper and effective response to climate change problems (Maibach *et al*., 2008).

According to a survey conducted by the Minnesota Department of Health (MDH) among a convenience sample of Board-certified nurses and physicians in Minnesota, only 21% of the participants felt adequately prepared to engage in discussions about climate change, and merely 4% reported discussing the topic with all or the majority of their patients (Kircher *et al*., 2022).

Previous research underscores the pressing need for better preparedness and resource allocation among public health officers to confront the looming threat of climate change effectively.

Surveys conducted among healthcare professionals in Minnesota unveil sobering realities, reflecting a palpable gap in preparedness and reluctance to engage patients in climate change discussions.

These findings carry profound implications for policymaking and practical interventions. Efforts must be redoubled to enhance health workers' understanding of the specific objectives outlined in the NCCP through tailored training initiatives and knowledge dissemination efforts.

Furthermore, proactive measures are essential to embed the NCCP seamlessly into healthcare practices. Advocacy campaigns aimed at sensitizing health workers to climate change mitigation and adaptation strategies should be intensified. Establishing guidelines and protocols for climate-resilient healthcare practices and facilitating access to pertinent resources are pivotal steps in this endeavor.

Conclusion

Climate change stands as a growing catalyst for health challenges among patients, with repercussions reaching far into the future. Healthcare professionals, widely recognized for their credibility in dispensing health-related information, shoulder the responsibility of enlightening both the public and policymakers about the connection between climate change and health.

The study's findings suggests poor practice among most health workers regarding Nigeria's national climate change policy, in the context of climate change resilience actions. There is therefore an urgent call to action, necessitating the formulation of a practical guide or action plan to elucidate health workers' roles in advancing positive climate change mitigation and adaptation efforts.

Recommendations

1. There is need for the development of a comprehensive action guide delineating health workers' duties and responsibilities in aligning with Nigeria's National Climate Change Policy (NCCP).
2. Future research initiatives should aim to explore health workers' practice of the national climate change policy across diverse regions of Nigeria and other developing nations.
3. Future researches should also employ a mix of quantitative and qualitative methodologies, which will enrich the depth of understanding in this critical area.

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