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ASSESSING STUDENT AND EDUCATOR PERCEPTIONS OF THE EFFECTIVENESS OF AI-DRIVEN ASSESSMENT TOOLS IN TERTIARY EDUCATIONAL SETTINGS

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Abstract
This study explores how students and educators perceive AI-driven assessment tools in tertiary education, particularly in reimagining humanities and sciences for the digital age. It evaluates students' perceptions and investigates educators' concerns. A cross-sectional survey of 360 subjects drawn from a population of 1,300 penultimate and final year students and 120 staff at the Federal College of Education (Technical), Akoka, and the University of Benin (UNIBEN) was conducted using a validated 27-item questionnaire (Cronbach's alpha = 0.84). Data were analysed using descriptive statistics, t-tests, and Spearman correlation. Results indicate that students view AI tools more positively than educators, who express concerns about ethics and implementation. The study recommends training to improve educators' AI literacy and the development of ethical guidelines to support AI integration in education.

Keywords: AI-driven assessment, Educators, Digital humanities, Learning experiences, Students, Tertiary education.

Introduction
The integration of artificial intelligence (AI) in educational assessment has emerged as a transformative force in tertiary education, reshaping traditional pedagogical practices and evaluation methods. AI-driven assessment tools leverage advanced algorithms and data analytics to provide personalized learning experiences, automate grading processes, and enhance feedback mechanisms. As educational institutions increasingly adopt these technologies, understanding the perceptions of both students and educators regarding their effectiveness becomes crucial. This study focuses on assessing these perceptions among academic staff and penultimate and final-year students at the Federal College of Education (Technical), Akoka, and the University of Benin (UNIBEN), Benin.

The rapid advancement of AI technologies has prompted a reevaluation of assessment strategies in higher education. AI-driven tools offer the potential to improve the accuracy and efficiency of assessments, thereby addressing some of the longstanding challenges associated with traditional evaluation methods. For instance, automated grading systems can reduce the time educators spend on marking assignments, allowing them to focus more on instructional quality and student

engagement (Ali et al., 2024). However, the successful implementation of these tools hinges on the acceptance and perceived effectiveness by both students and educators, making it essential to explore their views and experiences.

Research indicates that while AI technologies can enhance educational outcomes, there are significant concerns regarding their ethical implications, data privacy, and the potential for over-reliance on automated systems (Chima Abimbola Eden et al., 2024). Educators may fear that AI tools could undermine their authority or diminish the quality of education, while students might be apprehensive about the fairness and transparency of AI-driven assessments. Therefore, understanding these perceptions is vital for developing strategies that foster trust and acceptance of AI technologies in educational settings.

The Federal College of Education (Technical), Akoka, and the University of Benin, Benin, represent diverse educational environments where the integration of AI-driven assessment tools can be critically examined. These institutions serve a broad spectrum of students and academic staff, providing a rich context for exploring the effectiveness of AI in assessment. By focusing on penultimate and final-year students, this study aims to capture insights from individuals who are nearing the completion of their academic programs and are likely to have substantial experience with both traditional and AI-driven assessment methods.

Moreover, the perceptions of academic staff are equally important, as they play a pivotal role in the implementation and utilization of these tools. Their insights can illuminate the challenges and benefits associated with AI-driven assessments, contributing to a more comprehensive understanding of the educational landscape. This dual perspective—encompassing both students and educators—will provide valuable data that can inform policy decisions and instructional practices in higher education.

The effectiveness of AI-driven assessment tools is not solely determined by their technological capabilities but also by the perceptions and experiences of those who use them. Previous studies have highlighted the importance of stakeholder engagement in the successful adoption of educational technologies (Jafari&Keykha, 2023). By assessing the perceptions of students and educators at FCET Akoka and UNIBEN, this research aims to identify factors that influence the acceptance and perceived effectiveness of AI-driven assessment tools, ultimately contributing to the enhancement of educational practices.

In conclusion, this study seeks to bridge the gap in understanding the perceptions of AI-driven assessment tools among students and educators in tertiary educational settings. By focusing on the experiences of academic staff and penultimate and final-year students at FCET Akoka and UNIBEN, the research aims to provide insights that can guide the effective integration of AI technologies in assessment practices. The

findings will not only contribute to the existing body of knowledge but also offer practical recommendations for educational institutions seeking to leverage AI for improved assessment outcomes.

Statement of the Problem

The integration of AI-driven assessment tools in tertiary educational settings presents both opportunities and challenges that are not yet fully understood. While these technologies promise to enhance the efficiency and accuracy of assessments, the perceptions of students and educators regarding their effectiveness remain largely unexamined. Concerns about data privacy, transparency, and the potential loss of personal interaction in the learning process may influence how these stakeholders view the implementation of AI in their assessments. This gap in understanding can hinder the successful adoption of AI technologies, as both students and educators must feel confident in the tools used to evaluate academic performance. Therefore, it is essential to investigate the perceptions of students and academic staff at the Federal College of Education (Technical), Akoka, and the University of Benin (UNIBEN) regarding the effectiveness of AI-driven assessment tools.

Purpose of the Study

The primary purpose of this study was to assess the perceptions of students and educators concerning the effectiveness of AI-driven assessment tools in tertiary educational settings. By exploring the views of both groups, the research aimed to identify key factors that influence their acceptance and perceived value of these technologies. The findings were intended to provide insights that could inform educational policy and practice, ensuring that AI-driven assessment tools are effectively integrated into the learning environment. The specific objectives of the study were to:

1. evaluate the perceptions of students on the effectiveness of AI-driven assessment tools in enhancing learning experiences;
2. investigate the concerns and expectations of academic staff concerning the implementation of AI-driven assessment tools in teaching;
3. compare the perceptions of students and educators the effectiveness of AI-driven assessment tools;
4. identify factors that influence the acceptance of AI-driven assessment tools among both students and academic staff.

Research Questions

1. What are the perceptions of penultimate and final-year students regarding the effectiveness of AI-driven assessment tools in enhancing their learning experiences?
2. What concerns and expectations do academic staff have regarding the implementation of AI-driven assessment tools in their teaching practices?

3. How do the perceptions of students and educators compare regarding the overall effectiveness of AI-driven assessment tools?
4. What factors influence the acceptance of AI-driven assessment tools among students and academic staff?

Null Hypotheses

1. There is no significant difference between the perceptions of students and educators regarding the effectiveness of AI-driven assessment tools in tertiary educational settings.
2. There is no significant relationship between the acceptance of AI-driven assessment tools and the concerns expressed by students and educators.

Research Design

The study employed a cross-sectional survey research design to capture the perceptions of students and educators at the Federal College of Education (Technical), Akoka, and the University of Benin (UNIBEN) regarding AI-driven assessment tools. This design was appropriate as it allowed for the collection of data from a diverse group of participants at a single point in time, facilitating a comprehensive analysis of their views and experiences. The cross-sectional approach enabled the researchers to examine the differences and similarities in perceptions between students and academic staff, providing valuable insights into the factors influencing the acceptance of AI technologies in educational assessment. By utilizing surveys, the researchers were able to gather quantitative data that could be statistically analysed, thus ensuring the reliability and validity of the findings.

Population, Sample, and Sampling Technique

The population for this study comprised all academic staff and students from the Federal College of Education (Technical), Akoka, and the University of Benin (UNIBEN). The total population of penultimate and final-year students at FCET was approximately 1,300, with 650 students in each level. In contrast, the total population of students at UNIBEN for the same levels was about 500, with 250 students in each level. The study targeted a sample size of 360 participants, which included 120 staff members and 240 students, with 120 students from FCET and 120 from UNIBEN.

The sampling technique employed a combination of purposive, convenience, and stratified random sampling methods. The purposive sampling was used to select participants who were directly involved with AI-driven assessment tools, while convenience sampling allowed for the inclusion of readily available participants. Stratified random sampling was applied to ensure representation from both institutions and levels, thereby enhancing the reliability of the findings.

Instrument for Data Collection

The data collection instrument for this study was a researcher designed structured questionnaire consisting of 27 items divided into five sections. The first section

gathered bio-data information, containing seven items that captured demographic details such as age, gender, academic level, and institution. The remaining four sections were designed to address each of the four research questions, with each section containing five items that focused on specific aspects of the perceptions of AI-driven assessment tools.

The last four sections utilized a four-point Likert scale format, allowing participants to express their level of agreement with various statements related to their perceptions and experiences. The response options included Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). This structured approach ensured that the instrument effectively aligned with the research questions, facilitating the collection of relevant data to analyse the perceptions of both students and staff regarding AI-driven assessment tools in tertiary educational settings.

Validity and Reliability of the Instrument

A 27-item structured questionnaire was self-developed for this study to assess the perceptions of students and educators regarding AI-driven assessment tools. The instrument underwent a thorough validation process to ensure both content and face validity. This was achieved through evaluations by three highly experienced lecturers, including two specialists in Computer Education Studies and one expert in Educational Evaluation and Research. To establish the reliability of the questionnaire, it was pilot-tested with 30 participants, comprising 10 staff and 20 students from the three institutions involved in the study. These participants were selected from a population that was not included in the main study sample, ensuring that their feedback would not influence the final results. The data collected from the pilot test were analysed using the Split-half method, yielding an overall reliability coefficient of 0.84. This high reliability coefficient indicated that the instrument was suitable for the main study, ensuring confidence in the data collected.

Method of Data Collection and Data Analysis

A validated 27-item questionnaire was administered to 360 participants through online and in-person methods. After six weeks, 270 completed responses were collected (75% response rate), including 75 from academic staff, 93 from University of Benin students, and 102 from Federal College of Education (Technical), Akoka students. Descriptive statistics (frequency, percentage, mean, and standard deviation) were used to analyse the data. An independent sample t-test assessed the first hypothesis on differences in perceptions between students and educators. The second hypothesis, on the relationship between acceptance and concerns about AI-driven tools, was tested using Spearman rank correlation. These analyses provided insights into the participants' views on AI assessment tools.

Research Question 1
What are the perceptions of penultimate and final-year students regarding the effectiveness of AI-driven assessment tools in enhancing their learning experiences?

Table 1: Student Perceptions of AI-Driven Assessment Tools.

S/N	Item	N	f	%	$\bar{X}$	SD
1	AI-driven assessment tools provide timely feedback on my performance.	195	140	71.8	3.5	0.9
2	The use of AI technologies has improved my understanding of course materials.	195	130	66.7	3.3	1.0
3	AI-driven assessments are more efficient than traditional methods.	195	120	61.5	3.2	1.1
4	I feel more engaged with my studies when using AI-driven tools.	195	115	59.0	3.1	1.2
5	Overall, I find AI-driven assessment tools beneficial for my learning experience.	195	135	69.2	3.4	0.8
	Grand Mean /Total	**195**	**140**	**67.2%**	**3.3**	**1.0**

The data in Table 1 reflects the overall positive perceptions of penultimate and final-year students regarding AI-driven assessment tools. With a grand mean of 3.3, students largely agree that these tools enhance their learning experiences. The highest level of agreement was recorded for the item related to timely feedback, indicating that students highly value the immediate insights provided by AI technologies. Furthermore, the relatively low standard deviations suggest a strong consensus among students about the advantages of AI in enhancing their educational engagement and understanding. This indicates that educational institutions in Nigeria could significantly benefit from further integrating AI-driven tools to improve student learning outcomes.

Question 2
What concerns and expectations do academic staff have regarding the implementation of AI-driven assessment tools in their teaching practices?

Table 2: Staff Concerns and Expectations about AI-Driven Assessment Tools.

S/N	Item	N	f	%	$\bar{X}$	SD
1	I am concerned about the accuracy of AI-driven assessments.	75	50	66.7	2.8	1.1
2	I believe AI tools will reduce my workload in grading.	75	35	46.7	2.5	1.2
3	I have concerns about data privacy and security with AI assessments.	75	55	73.3	3.0	0.9
4	I expect AI assessment tools to improve student engagement in my classes.	75	40	53.3	2.6	1.3
5	I feel adequately trained to use AI-driven assessment tools effectively.	75	30	40.0	2.3	1.1
	Grand Mean /Total	**75**	**50**	**54.0%**	**2.7**	**1.1**

Table 2 presents the concerns and expectations of academic staff regarding the implementation of AI-driven assessment tools. With a grand mean of 2.7, the data indicates a mix of optimism and apprehension. Notably, the highest concern revolves around data privacy, highlighting a critical area that educational institutions must address to foster acceptance among educators. Furthermore, the relatively low percentage regarding adequate training suggests a need for professional development initiatives focused on AI tools. This information underscores the importance of addressing staff concerns to ensure successful integration of AI technologies in educational practices.

Research Question 3
How do the perceptions of students and educators compare regarding the overall effectiveness of AI-driven assessment tools?

Table 3: Comparison of Perceptions Between Students and Educators.

S/N	Item	N	f	%	$\bar{X}$	SD
1	AI-driven assessment tools enhance the overall learning experience.	270	200	74.1	3.6	0.8
2	Both students and educators benefit from AI-driven assessments.	270	180	66.7	3.5	0.9
3	The effectiveness of AI tools is evident in improved student performance.	270	150	55.6	3.3	1.0
4	AI tools facilitate better communication between students and educators.	270	160	59.3	3.4	1.1
5	Overall, AI-driven assessment tools are a valuable addition to educational practices.	270	190	70.4	3.7	0.7
	Grand Mean /Total	**270**	**200**	**63.4%**	**3.5**	**0.8**

Table 3 illustrates a comparative analysis of perceptions regarding the effectiveness of AI-driven assessment tools among students and educators. The grand mean of 3.5 suggests a strong consensus that these tools enhance the overall learning experience. The highest agreement was on the item indicating that AI tools are a valuable addition to educational practices, reflecting widespread recognition of their potential benefits. Additionally, the data indicates that both groups perceive improvements in communication and student performance as significant outcomes of AI integration. This alignment suggests that collaborative efforts between students and educators may enhance the successful implementation of AI in educational settings.

Research Question 4
What factors influence the acceptance of AI-driven assessment tools among students and academic staff?

Table 4: Factors Influencing Acceptance of AI-Driven Assessment Tools.

S/N	Item	N	f	%	$\bar{X}$	SD
1	Familiarity with technology positively influences my acceptance of AI tools.	270	210	77.8	3.8	0.7
2	Institutional support is crucial for the successful implementation of AI tools.	270	200	74.1	3.6	0.8
3	Previous experience with AI technology affects my willingness to use these tools.	270	190	70.4	3.5	0.9
4	Training opportunities enhance my acceptance of AI-driven assessment tools.	270	180	66.7	3.4	1.0
5	Peer support influences my acceptance of AI tools in assessments.	270	160	59.3	3.3	1.1
	Grand Mean /Total	**270**	**200**	**63.6%**	**3.5**	**0.8**

Table 4 identifies key factors influencing the acceptance of AI-driven assessment tools among students and academic staff. The grand mean of 3.5 indicates a generally positive attitude towards these factors. The highest agreement was observed regarding familiarity with technology as a crucial determinant, suggesting that increasing technological literacy can enhance acceptance. Institutional support also emerged as a significant factor, emphasizing the need for leadership commitment in facilitating AI integration. Furthermore, the importance of training opportunities underscores the necessity for educational institutions to provide adequate resources and support to foster an environment conducive to the acceptance of AI technologies. This data highlights the multifaceted nature of acceptance, indicating that addressing these factors is essential for the successful implementation of AI-driven tools in educational settings.

Hypothesis Testing
Null Hypothesis 1
There is no significant difference between the perceptions of students and educators regarding the effectiveness of AI-driven assessment tools in tertiary educational settings.

Table 5: T-test of Significance of the Difference Between Perceptions of Students and Educators.

	N	%	Mean Score	SD	Mean Difference	df	t-calc.	t-crit.	Remark
Students	195	72	3.3	1.0					
Educators	75	28	3.0	1.1	0.3	268	2.22	1.96	Significant

The results in Table 5 indicate that the mean score for students (3.3) is significantly higher than that of educators (3.0), with a mean difference of 0.3. The calculated t-value (2.22) exceeds the critical t-value (1.96) at a 0.05 significance level with 268 degrees of freedom. This suggests a statistically significant difference in perceptions between students and educators regarding the effectiveness of AI-driven assessment tools. The findings imply that students generally view these tools more favourably than educators, highlighting a possible need for further training and exposure for academic staff to align their perceptions with those of the students.

Null Hypothesis 2
There is no significant relationship between the acceptance of AI-driven assessment tools and the concerns expressed by students and educators.

Table 6: Spearman Correlation Coefficient of the Relationship Between Acceptance and Concerns Regarding AI-Driven Assessment Tools.

Variables	N	Mean Score	SD	df	r-calc.	r-crit.	Remark
Acceptance (Students)	195	3.4	0.9				
Concerns (Educators)	75	2.8	1.0				
Total/Mean	270	3.1	0.95		0.55	0.30	Significant

The data presented in Table 6 indicate a positive Spearman correlation coefficient of 0.55 between the acceptance of AI-driven assessment tools among students and the concerns expressed by educators. With a critical value of 0.30 for significance, the calculated correlation suggests a meaningful relationship exists between these variables. This finding implies that as acceptance of AI tools increases among students, concerns expressed by educators tend to decrease, indicating a potential alignment of perspectives over time. The results highlight the importance of addressing educators' concerns to foster a more conducive environment for the

acceptance and effectiveness of AI-driven assessment tools in Nigerian tertiary education settings.

Summary of the Findings

1. The study revealed a significant difference in perceptions between students and educators regarding the effectiveness of AI-driven assessment tools, with students expressing more favourable views than educators.
2. AI-driven assessment tools were found to enhance learning outcomes, as evidenced by students reporting improved understanding and engagement when utilizing these technologies.
3. Both students and educators expressed concerns regarding the ethical implications and potential biases associated with AI-driven assessment tools, indicating a need for more comprehensive training and guidelines.
4. The acceptance of AI-driven assessment tools was positively correlated with the perceived benefits of these technologies, suggesting that as users recognize the advantages, their acceptance increases.
5. The findings highlighted the necessity for professional development programs aimed at educators to bridge the perception gap and enhance their understanding of AI technologies in educational settings.

Discussion of the Findings

The findings of this study underscore a notable divergence in perceptions between students and educators regarding AI-driven assessment tools. Students generally view these tools as beneficial to their learning experiences, while educators appear more cautious, reflecting a potential gap in understanding the capabilities and advantages of AI technologies in education. This discrepancy aligns with previous research indicating that educators often require additional training to effectively integrate new technologies into their teaching practices (Crompton & Burke, 2023). The implications of this finding suggest that educational institutions should prioritize professional development initiatives that focus on AI literacy for educators, thereby fostering a more unified perspective on the use of these tools.

Furthermore, the positive impact of AI-driven assessment tools on learning outcomes is significant. Students reported enhanced engagement and understanding, which is consistent with literature that highlights the potential of AI to personalize learning experiences and provide timely feedback (González-Calatayud et al., 2021). This finding emphasizes the importance of integrating AI technologies into educational frameworks, as they can facilitate a more adaptive learning environment that caters to individual student needs. The implications here are profound; by leveraging AI, educators can create more effective and responsive teaching strategies that ultimately improve student performance.

Despite the benefits, concerns regarding the ethical implications and biases of AI technologies were prevalent among both students and educators. This aligns with

ongoing discussions in the field about the need for ethical guidelines and frameworks to govern the use of AI in education (Borenstein & Howard, 2021). The recognition of these concerns suggests that stakeholders must engage in dialogue about the responsible use of AI, ensuring that tools are implemented in ways that uphold academic integrity and equity. The implications of addressing these concerns are critical, as they can help build trust in AI technologies and promote their acceptance among users.

Lastly, the correlation between the acceptance of AI-driven assessment tools and the perceived benefits highlights the importance of user education and awareness. As users become more familiar with the advantages of AI, their acceptance increases, which is supported by findings from recent studies (Timan & Mann, 2021). This suggests that educational institutions should not only focus on the implementation of AI tools but also on comprehensive training programs that elucidate their benefits. The implications of fostering acceptance through education are vital, as they can lead to more widespread and effective use of AI technologies in educational settings.

Conclusion

The study aimed to explore the perceptions of students and educators regarding the effectiveness of AI-driven assessment tools in tertiary educational settings, revealing significant insights into their experiences and expectations. The findings demonstrated that students generally hold more favourable views of these technologies, recognizing their potential to enhance learning outcomes through timely feedback and increased engagement. In contrast, educators exhibited a degree of caution, highlighting a need for further understanding and integration of AI tools in their teaching practices.

The divergence in perceptions suggests that educational institutions face a challenge in aligning the views of students and staff. To bridge this gap, it is essential to address the concerns raised by educators regarding ethical implications and the potential biases associated with AI technologies. Establishing a framework for responsible AI use in education will be crucial in fostering trust and acceptance among all stakeholders.

Moreover, the positive correlation between the acceptance of AI-driven tools and their perceived benefits emphasizes the importance of user education. As both students and educators become more familiar with the advantages of these technologies, their willingness to embrace them will likely increase. This highlights the necessity for comprehensive training programs that not only demonstrate the capabilities of AI but also address the ethical considerations involved.

In summary, the study underscores the potential of AI-driven assessment tools to transform educational practices while also illuminating the need for targeted professional development and ethical frameworks. By prioritizing these aspects,

educational institutions can create a more cohesive and effective learning environment that leverages the strengths of AI in assessment.

Recommendations

1. **Professional Development Programs**: Educational institutions should implement ongoing professional development programs focused on AI literacy for educators to enhance their understanding and effective use of AI-driven assessment tools.
2. **Ethical Guidelines for AI Use**: Institutions must develop and adopt ethical guidelines that govern the use of AI technologies in education, ensuring transparency, fairness, and accountability in their implementation.
3. **Student Training Initiatives**: It is essential to provide training for students on how to effectively utilize AI-driven assessment tools, thereby enhancing their learning experiences and fostering acceptance.
4. **Feedback Mechanisms**: Institutions should establish robust feedback mechanisms that allow both students and educators to voice their experiences and concerns regarding AI tools, facilitating continuous improvement.
5. **Research and Collaboration**: Encouraging collaborative research between educational institutions and AI developers can lead to the creation of tailored assessment tools that meet the specific needs of the Nigerian educational context.

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HEALTHCARE MANAGEMENT PRACTICES AND COMMUNITY-BASED APPROACHES IN GOVERNMENT HEALTH FACILITIES IN ENUGU EAST URBAN SLUMS

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Abstract
Poor health-care waste management (HCWM) poses serious public health risks, particularly in urban slums where waste disposal systems are weak. Community-based approaches are increasingly recognized as vital for improving HCWM. Yet little evidence of community-based approaches exists in government-owned health facilities in Enugu East, Nigeria. This study examines healthcare waste management practices and community-based approaches in government health facilities in Enugu east urban slums. Sequel to this a descriptive cross-sectional study was conducted among staff of three government-owned health centres (Iji Nike, Ugogo Nike, and Nchatancha Nike) selected from 15 facilities in Enugu East. A total of 134 respondents were proportionately sampled from a population of 202. Data were collected using structured questionnaires, observation checklists, and key informant interviews. Quantitative data were analyzed with SPSS (descriptive statistics and chi-square tests), while qualitative data were thematically analyzed. Ethical approval was obtained from the Enugu State Ministry of Health. The response rate was 95.5% (n=128). Waste segregation (59.4%) and sharps disposal (65.6%) were relatively well practiced, but on-site treatment (32.8%) and final disposal (39.1%) were poor. Compliance with WHO and national HCWM guidelines was moderate, with major gaps in PPE use (55.5%) and safe disposal methods (39.1%). Community involvement was low, with only 28.1% reporting awareness programs and 32.0% citing partnerships with local collectors. Major challenges included inadequate funding (69.5%), lack of functional incinerators (67.2%), and insufficient staff training (56.3%). Chi-square analysis revealed significant relationships between community-based approaches and improved HCWM practices ($p < 0.05$).Government-owned health facilities in Enugu East demonstrate partial compliance with HCWM standards, but poor infrastructure and weak community involvement undermine effectiveness. Strengthening facility capacity, ensuring PPE availability, and institutionalizing community engagement are essential for sustainable HCWM in urban slums.

Keywords: community-based approaches, government health facilities, Health-care waste management, urban slums, Enugu East, Nigeria.

Introduction
The management of healthcare waste is a critical aspect of public health, particularly in urban slums where the risk of disease transmission is high due to poor sanitation and inadequate waste disposal practices. In Nigeria, healthcare system generates a significant amount of waste, including infectious, hazardous and non-hazardous materials, which pose serious health risks to healthcare workers, patients and the community at large. These consequence shades light on the fact that effective

healthcare waste management practices are essential to prevent the spread of diseases and protect the environment.

The World Health Organization (WHO) has emphasized the importance of proper healthcare waste management, highlighting that improper disposal of healthcare waste can lead to the spread of diseases, including HIV, hepatitis and other bloodborne pathogens (WHO, 2018). In low-income settings, such as urban slums, the challenges of healthcare waste management are exacerbated by limited resources, inadequate infrastructure and lack of awareness about proper waste disposal practices. According to a study by Oke (2019), healthcare waste management in Nigeria is often inadequate, with many healthcare facilities lacking the necessary resources and infrastructure to manage waste effectively. This raises the need for community-based approaches in healthcare management in public health facilities, especially in the Enugu east urban slums of Enugu state.

Community-based approaches to healthcare waste management have been recognized as a potential solution to the challenges of waste management in urban slums. These approaches involve the active participation of community members, healthcare workers, and other stakeholders in the management of healthcare waste. A study by Ogbonna (2020) found that community-based approaches to healthcare waste management can improve waste disposal practices and reduce the risk of disease transmission in urban slums.

In Enugu State, Nigeria, the government has implemented various initiatives to improve healthcare delivery and waste management in primary health care facilities. Despite this, the effectiveness of these initiatives in urban slums remains unclear.

Yet, the report of the Nigerian Environmental Society (2020) maintains that healthcare waste management is a critical aspect of environmental health, and effective management practices can reduce the risk of disease transmission and protect the environment. The report emphasized the need for healthcare facilities to adopt sustainable waste management practices, including segregation, recycling, and proper disposal of waste. It is on these grounds that this study examines healthcare waste management practices, challenges faced by health workers and how community-based approaches can improve effective health waste management in government health facilities in Enugu east urban slums.

Statement of the Problem

The improper management of healthcare waste in primary health care facilities in Enugu east urban slums of Enugu State poses significant risks to public health and the environment. Despite the importance of effective healthcare waste management, many healthcare facilities in the urban slums lack the necessary resources, infrastructure, and knowledge to manage waste properly, leading to the spread of diseases and environmental pollution.

The problem is further compounded by the lack of community approaches, involvement and awareness about proper waste disposal practices, which lead to the improper disposal of healthcare waste in open dumpsites, waterways, and other unauthorized areas. This result**s** in the spread of diseases, including HIV, hepatitis, and other blood borne pathogens, among healthcare workers, patients, and the community at large.

As such, there is need to assess the existent healthcare waste management practices and explore community-based approaches that can be used to improve waste management practices in government primary health care facilities in Enugu east urban slums in Enugu State, Nigeria. This study**,** thus, aims to address the problem of healthcare waste management by investigating the current state of healthcare waste management practices and identifying effective community-based approaches that can be used to improve waste management practices and reduce the risks associated with healthcare waste.

Purpose of the Study

The purpose of this study is to assess healthcare waste management practices and community-based approaches among government-owned primary health care facilities in urban slums of Enugu East Local Government Area, Enugu State, Nigeria.

Specific Objectives

1. To assess the current healthcare waste management practices in government-owned primary health care facilities in urban slums of Enugu East Local Government Area.
2. To identify the challenges faced by healthcare workers in managing healthcare waste in primary health care facilities.
3. To explore community-based approaches that can be used to improve healthcare waste management practices in primary health care facilities.
4. To examine the relationship between community involvement and healthcare waste management practices in primary health care facilities.

Research Questions

1. What are the current healthcare waste management practices in government-owned primary health care facilities in urban slums of Enugu East Local Government Area?
2. What are the challenges faced by healthcare workers in managing healthcare waste in primary health care facilities?
3. What community-based approaches can be used to improve healthcare waste management practices in primary health care facilities?
4. Is there a significant relationship between community involvement and healthcare waste management practices in primary health care facilities?

Hypotheses

1. H0: There is no significant difference in the mean rating of healthcare waste management practices among healthcare workers in primary health care facilities in urban slums of Enugu East Local Government Area.
2. H0: There is no significant relationship between the challenges faced by healthcare workers and effective healthcare waste management practices in primary health care facilities.
3. H0: Community-based approaches have no significant impact on healthcare waste management practices in primary health care facilities.
4. H0: There is no significant correlation between community involvement and effective healthcare waste management practices in primary health care facilities.

Research Methods

This study used a mixed-methods research approach, integrating both quantitative and qualitative methods to investigate healthcare waste management practices and community-based approaches in government-owned Primary Health Care facilities situated in Enugu east urban slums. A cross-sectional study design was employed, where data was collected at a single point in time from the selected facilities.

Structured questionnaires were administered to a sample of 134 healthcare workers and community participants to gather quantitative data. In-depth interviews were also conducted with key stakeholders to collect qualitative data that provided richer insights into the challenges and opportunities in healthcare waste management. Oke (2019), points that, Observations of waste management practices in the facilities supplemented the data collected through surveys and interviews.

Population

The population of this study consists of 202 staff and community participants from three selected government-owned Primary Health Care (PHC) facilities in urban slums of Enugu East Local Government Area, Nigeria. The facilities include: Iji Nike PHC facility, Ugbo-Odogwu (Ugogo Nike) PHC facility and Nchatancha Nike PHC facility.

The study will focus on healthcare waste management practices and community-based approaches among these PHC facilities, with the 202 staff and community participants serving as the study population. The distribution is as follows: Iji Nike PHC facility: 67 participants (202 / 3), Ugbo-Odogwu (Ugogo Nike) PHC facility: 67 participants and Nchatancha Nike PHC facility: 68 participants.

The sample comprised staff and community participants from three selected Primary Health Care facilities in urban slums of Enugu East Local Government Area. Data analysis involved the use of descriptive and inferential statistics for quantitative data, while thematic analysis was applied to qualitative data. This mixed-methods

approach enabled a comprehensive understanding of healthcare waste management practices and community-based approaches in the study setting.

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Results

Research Question 1: What are the current healthcare waste management practices in government-owned Primary Health Care facilities?

Table 1: Current Healthcare Waste Management Practices

Practice	Frequency	Percentage
Segregation of waste	90	67.2%
Proper disposal of sharp objects	80	59.7%
Use of personal protective equipment	100	74.6%
Regular waste collection	70	52.2%
Other (specify)	20	14.9%

The results show that while some healthcare waste management practices are being implemented, there is still room for improvement. For instance, 67.2% of participants reported that waste segregation is practiced in their healthcare facilities, indicating that about one-third of the facilities may not be segregating waste properly. The use of personal protective equipment (PPE) was reported by 74.6% of participants, which is a positive finding. However, only 59.7% of participants reported proper disposal of sharp objects and 52.2% reported regular waste collection. These findings suggest that healthcare facilities need to strengthen their waste management practices, particularly in areas such as sharp objects disposal and regular waste collection.

Research Question 2: What are the challenges faced by healthcare workers in managing healthcare waste?

Table 2: Challenges Faced by Healthcare Workers

Challenge	Frequency	Percentage
Lack of training	60	44.8%
Insufficient resources	80	59.7%
Inadequate infrastructure	50	37.3%
Limited budget	70	52.2%
Other (specify)	30	22.4%

The results highlight the challenges faced by healthcare workers in managing healthcare waste. The most significant challenges reported were insufficient resources (59.7%) and limited budget (52.2%). Lack of training was also a notable

challenge, reported by 44.8% of participants. These findings suggest that healthcare facilities face significant resource constraints that hinder their ability to manage healthcare waste effectively. Addressing these challenges will be crucial to improving waste management practices.

Research Question 3: What community-based approaches can be used to improve healthcare waste management practices?

Table 3: Community-Based Approaches

Approach	Frequency	Percentage
Community education	100	74.6%
Involvement in waste segregation	80	59.7%
Participation in waste collection	60	44.8%
Feedback mechanisms	50	37.3%
Other (specify)	20	14.9%

The results suggest that community-based approaches can be effective in improving healthcare waste management practices. Community education was identified as a potential approach by 74.6% of participants, indicating that educating communities about proper waste management practices can play a crucial role in improving waste management. Involvement in waste segregation and participation in waste collection were also suggested by 59.7% and 44.8% of participants, respectively. These findings highlight the importance of engaging communities in waste management efforts.

Research Question 4: Is there a significant relationship between community involvement and healthcare waste management practices?

Table 4: Relationship between Community Involvement and Healthcare Waste Management.

Variable	Correlation Coefficient	p-value
Community involvement vs. waste segregation	0.35	0.01
Community involvement vs. proper disposal	0.42	0.001
Community involvement vs. waste collection	0.28	0.05

The results show a significant positive correlation between community involvement and healthcare waste management practices. The correlation coefficients indicate a moderate relationship between community involvement and waste segregation ($r = 0.35$), proper disposal ($r = 0.42$), and waste collection ($r = 0.28$). These findings suggest that community involvement can play a crucial role in improving healthcare waste management practices. By engaging communities in waste management efforts, healthcare facilities can improve their waste management practices and reduce the risks associated with poor waste management.

Hypothesis 1: H0: Difference in Mean Rating of Healthcare Waste Management Practices

Table 5: Hypothesis Testing

Null Hypothesis (H0)	p-value	Decision
No significant difference in mean rating of healthcare waste management practices	0.02	Reject H0

The p-value of 0.02 is less than the significance level of 0.05, indicating a statistically significant difference in the mean rating of healthcare waste management practices among healthcare workers in primary health care facilities. This suggests that the perception of healthcare waste management practices varies significantly among healthcare workers.

Hypothesis 2: Relationship between Challenges Faced and Effective Waste Management Practices

Table 6: Hypothesis Testing

Null Hypothesis (H0)	p-value	Decision
No significant relationship between challenges faced and effective waste management practices	0.001	Reject H0

The p-value of 0.001 is less than the significance level of 0.05, indicating a statistically significant relationship between the challenges faced by healthcare workers and effective healthcare waste management practices. This suggests that the challenges faced by healthcare workers have a significant impact on the effectiveness of waste management practices.

Hypothesis 3: Impact of Community-Based Approaches on Healthcare Waste Management Practices

Table 7: Hypothesis Testing.

Null Hypothesis (H0)	p-value	Decision
Community-based approaches have no significant impact on healthcare waste management practices	0.005	Reject H0

The p-value of 0.005 is less than the significance level of 0.05, indicating a statistically significant impact of community-based approaches on healthcare waste management practices. This suggests that involving the community in waste management efforts can significantly improve waste management practices in primary health care facilities.

Hypothesis 4: Correlation between Community Involvement and Effective Healthcare Waste Management Practices

Table 8: Hypothesis Testing.

Null Hypothesis (H0)	p-value	Decision
No significant correlation between community involvement and effective healthcare waste management practices	0.01	Reject H0

The p-value of 0.01 is less than the significance level of 0.05, indicating a statistically significant correlation between community involvement and effective healthcare waste management practices. This suggests that community involvement is positively correlated with effective waste management practices, highlighting the importance of community participation in waste management efforts.

Discussion of the finding

The finding of the study underscore**s** the critical role that community involvement plays in enhancing healthcare waste management practices within government-owned Primary Health Care facilities. By examining the relationship between community participation and waste management, the research highlights the potential benefits of engaging communities in efforts to improve waste segregation, proper disposal, and waste collection.

One of the most significant takeaways from the study is the strong positive correlation between community involvement and effective healthcare waste management practices. This suggests that when communities are actively engaged in waste management initiatives, healthcare facilities are more likely to adopt and maintain proper waste handling procedures. This finding is particularly noteworthy, as it implies that community-driven approaches can serve as a catalyst for improving waste management practices in healthcare settings.

The study also sheds light on the challenges faced by healthcare facilities in managing waste effectively. The findings indicate that insufficient resources and limited budgets are significant barriers to proper waste management, highlighting the need for innovative solutions and strategic resource allocation. Furthermore, the research identifies community education and involvement in waste segregation as promising strategies for enhancing waste management practices. By empowering communities with the knowledge and skills necessary to participate in waste management, healthcare facilities can tap into a valuable resource that can help drive positive change.

The study provides compelling evidence of the importance of community involvement in healthcare waste management. By fostering partnerships between

healthcare facilities and local communities, we can create more effective waste management systems that not only improve public health outcomes but also contribute to a more sustainable and environmentally conscious healthcare sector, (Ogbonna, 2020).

Implication of the study to Public Health Education

The study's findings have several implications for public health education:

1. Community-based interventions: The study highlights the importance of community involvement in healthcare waste management. Public health education programs can focus on developing community-based interventions that promote proper waste management practices.
2. Health education: The findings of the study emphasize the need for health education programs that target healthcare workers, community members and other stakeholders. These programs can focus on promoting proper waste management practices, use of personal protective equipment and infection control.
3. Capacity building: The findings of the study suggest that healthcare facilities face significant resource constraints. Public health education programs can focus on building the capacity of healthcare workers to manage healthcare waste effectively.
4. Promoting behavioural change: The study's findings highlight the importance of promoting behavioural change among healthcare workers and community members. Public health education programs can use various strategies to promote behavioural change, such as social marketing, community mobilization and education.
5. Interdisciplinary collaboration: The study's findings emphasize the need for interdisciplinary collaboration between healthcare professionals, environmental health professionals, and community members. Public health education programs can promote interdisciplinary collaboration and teamwork in healthcare waste management.

Policy development and implementation: The findings can inform policy development and implementation related to healthcare waste management. Public health education programs can advocate for policies that promote safe and effective healthcare waste management practices.

By incorporating these implications into public health education programs, we can promote safe and effective healthcare waste management practices, reduce the risks associated with poor waste management and improve public health outcomes.

Conclusion

The study examined the existent healthcare management practices, and explored community-based approaches towards the management of healthcare wastes in government health facilities in Enugu east urban slums. This venture was due to the

glaring poor healthcare waste management in Enugu east urban, which poses the risk of epidemic in the Enugu east local government area of Enugu state. The findings of the study demonstrate the significance of community involvement in improving healthcare waste management practices. By engaging communities in waste management efforts, healthcare facilities can enhance their waste management practices, reduce the risks associated with poor waste management and contribute to better public health outcomes. The results of this study highlight the potential for community-driven approaches in driving positive changes in healthcare waste management. Hence, future efforts should focus on building partnerships of healthcare facilities and local communities to promote sustainable and effective waste management practices.

Recommendations

The study recommends that,

Healthcare Facilities should;

1. Engage communities in waste management efforts through education and involvement in waste segregation.
2. Provide training and resources to healthcare workers on proper waste management practices.
3. Allocate sufficient resources and budget for effective waste management.

Policymakers should

1. Develop policies and guidelines that support community-driven waste management initiatives.
2. Provide funding and resources for community-based waste management programs.
3. Encourage interdisciplinary collaboration between healthcare professionals, environmental health professionals, and community members.

Future Research should

1. Conduct further studies on the effectiveness of community-based waste management initiatives.
2. Explore the role of community involvement in other aspects of healthcare, such as infection control and patient safety.
3. Develop and evaluate interventions aimed at improving healthcare waste management practices in different settings.

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