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## Editorial

### Metrics of Ghana-Based Journals in Scopus and SCImago: An Overview

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#### Abstract

Ghana-based peer-reviewed journals are gaining global recognition as outlets for scientific and scholarly outputs. This paper provides a brief overview of eight journals indexed in Scopus, using data from the SCImago Journal & Country Rank (SJR) as of March 2024. In my analysis, I focused on quartile rankings, publication output, gender participation, and citation metrics. Overall publication output is low, with most titles producing fewer than sixty citable papers in three years. Specifically, only the Journal of Advocacy, Research and Education has a Q2 ranking, while the Ghana Medical Journal has the highest impact, with an H-index of 33 and an SJR of 0.260 (Q3). Apart from these two journals, all the other journals are rated Q4. Citation activity is uneven, with average citations per document below one, suggesting limited research visibility. Female authorship ranges from roughly one-quarter to nearly half of contributors, with the highest rate in the Ghana Dental Journal. The editorial suggests that, amidst the existing challenges in low-resource settings in Africa, Ghana's scholarly publishing has growth and impact potential. Recommendations include improving editorial standards, fostering international collaboration, and strengthening institutional support for publishing infrastructure.

**Keywords:** Citations, Gender Participation, Ghana, Research Visibility, Scholarly Publishing, SCImago Journal & Country Rank, Scopus, Journal Impact.

#### 1. Introduction

In this editorial, I focused on international journals indexed in Scopus®, one of the most widely accepted journal databases, known for its high publishing standards and rigorous evaluation system. Over the years, most journals have strived to meet the quality standards required for Scopus indexing (Thelwall, Sud, 2022).

The impact of a country's research ecosystem is often reflected not only in the quantity of studies it produces but also in the quality of the journals based in it. Journals that are indexed in internationally respected databases such as Scopus [Elsevier®] are seen to have met very rigorous

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publishing standards. Based on Scopus data, other indexes like the SCImago Journal & Country Rank (SJR) provide metric-based ranking of the journals based on several key indicators (SCImago, 2025). These indicators include quartile rankings, publication output, gender participation, and citation metrics. International journals in Africa face a range of challenges and opportunities (Sarfo, 2019; Sarfo, 2024). In low-resource settings like Ghana, journals face various challenges that often affect their impact (Sarfo, 2019).

In March 2025, the SJR database listed eight international journals based in Ghana since 2024. The purpose of this editorial is to analyse the quality and quantity of indicators of these few journals that have made it to Scopus. In this brief analysis, I offered reflections on the metrics achieved and the distance still to be covered. This editorial serves as both an analytical assessment and a personal reflection on the current state of Ghana-based scholarly publishing, highlighting its accomplishments, limitations, and the necessary changes I believe are essential to elevate Ghana-based journals to the international stage.

## 2. Methods

For this review, I drew directly on the SJR March 2025 metrics from Scopus, as an Editor-in-Chief of one of the eight Ghana-based journals currently indexed in Scopus. These journals cover fields from medicine and dentistry to ecology, applied research, and education. I focused on the following key indicators: SJR ranking and quartile, H-index, citation counts over three years, number of citable documents, average citations per document, references per document for 2024, and the percentage of female authors contributing during the same year.

## 3. Metrics and Reflections

From my assessment based on the SJR data (see Table 1) and work experience with editors, reviewers, and researchers based in low-resource settings, this editorial provides a balanced perspective of what the data is saying, the practical challenges such journals face, including financial strain, minimal institutional and national support, and weaknesses in dealing with emerging publishing challenges.

**Table 1.** Ghana-based journals in SCImago (March 2025)

Title	SJR (Quartile)	H-index	Total Docs (2024)	Total Docs (3 yrs)	Total Refs (2024)	Citations (3 yrs)	Citable Docs (3 yrs)	Citations/Doc (2 yrs)	Ref/Doc (2024)	% Female (2024)
Ghana Medical Journal	0.260 (Q3)	33	40	168	1119	119	160	0.62	27.98	38.31
West African Journal of Applied Ecology	0.177 (Q4)	18	13	43	708	28	43	0.66	54.46	25.64
Journal of Advocacy, Research and Education	0.173 (Q2)	3	37	41	1264	27	39	0.36	34.16	42.86
Health Sciences Investigations Journal	0.128 (Q4)	3	62	69	1958	9	59	0.08	31.58	35.91
Postgraduate Medical Journal of Ghana	0.126 (Q4)	2	21	69	432	10	60	0.13	20.57	30.00
African Journal of Applied Research	0.124 (Q4)	3	65	100	2472	39	100	0.43	38.03	29.91
Journal of the Ghana Science Association	0.107 (Q4)	3	20	39	788	4	39	0.05	39.40	24.00
Ghana Dental Journal	0.103 (Q4)	1	11	26	245	2	24	0.10	22.27	45.16

Among the significant findings are as follows:

### **3.1. A small number of Scopus-indexed journals**

Compared to other West African countries, such as Nigeria, which has 28 Scopus journals, seeing only eight Ghana-based journals indexed gives me a double perspective as Editor-in-Chief. From one angle, I am glad that some Ghana-based journals have overcome tremendous barriers to gain global recognition. From another angle, eight is a very modest figure for a country with Ghana's vibrant research base, where local universities are doing exceptionally well in research, according to the Scopus database. From my personal observation, many promising journals are still operating outside indexing databases, often due to publication irregularities, resource limitations, or a lack of technical expertise to meet the extremely rigorous indexing standards of platforms such as Scopus.

### **3.2. Modest impact scores and quartile (Q) spread**

Among the eight journals, only the Journal of Advocacy, Research and Education broke into Q2. The Ghana Medical Journal continues to lead the impact table with an SJR of 0.260 (Q3) and an H-index of 33. Aside from these two journals, the remaining journals remain in Q4, with none yet occupying Q1. This distribution demands urgent attention to the question of impact rather than treating them as mere metrics. This urgency is needed as journals can only climb in rank if their research output is widely cited, accessible, and trusted by the global community.

### **3.3. Low publication output**

One recurring challenge I observed among these Ghana-based journals is their low publication output. Several journals published fewer than 60 papers over three years, a pattern that restricts growth in readership and citation. In an earlier editorial, I observed that maintaining a regular issue schedule throughout the year for most of these journals often poses challenges, including the unavailability of reviewers, fewer high-quality papers, and limited funding (Sarfo, 2019). Without steady national and institutional support, it becomes difficult to build high-impact journals in such contexts.

### **3.4. Uneven citation performance**

In addition to the issues raised, the gaps in the citation data were striking. For instance, the West African Journal of Applied Ecology performs relatively well, with 0.66 citations per document. Nevertheless, the Journal of the Ghana Science Association sits at just 0.05. Such disparities suggest that some journals reach broader international audiences better, while others remain confined to a limited readership. In my experience, this often has more to do with what happens after papers are published, in terms of their sharing and discoverability and goes beyond just research quality alone.


### **3.5. Gender participation and authorship**

Gender balance in research publishing has long been an essential issue for inclusiveness and equity. Across the eight journals, female authorship ranged between 24 % and 45 %. The Ghana Dental Journal recorded the highest proportion of women contributors, with nearly half the representation. Although encouraging, the variation across fields shows that structural barriers, such as mentorship gaps, funding inequities, and family-care constraints, continue to influence who writes and gets published (Hengel, 2022; Schucan Bird, 2011).

## **4. Conclusion**

This editorial is a brief analysis of SJR data, and it offers a sense of cautious optimism to all stakeholders in publishing scholarly journals in Ghana. It shows that, although there are only a few Ghana-based journals in Scopus, their inclusion in the database is a milestone worth celebrating. Their modest SJR scores, low citation rates, and small publication volumes highlight the need for journal publishers, with stakeholder support, to address structural challenges. Based on my objective findings and personal reflections as an Editor-in-Chief, journals in Ghana should strengthen their editorial systems and culture of high-quality publishing, and invest in their editors, reviewers, and authors.

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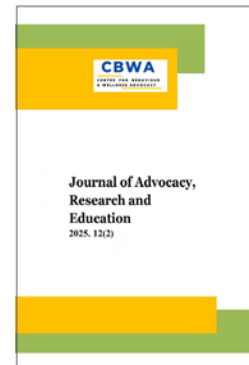
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## Articles

### Youth's Perspectives of Ghana's Education System: Implications for Educational Policy Formulation

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#### Abstract

This study investigated Ghanaian youth's perceptions of the purpose, learning environment, and pedagogical effectiveness of their education system. Employing a robust concurrent mixed-methods design, data were collected from 1,451 Junior/Senior High School students via surveys and from 120 in-school and out-of-school youth through focus group discussions across Ghana's diverse ecological zones. Findings reveal youth profoundly value education for future employment, leadership, and societal contribution, yet identify a significant disparity between these aspirations and the system's current theoretical, exam-oriented focus. While physical environments are generally perceived as conducive, qualitative insights highlight pervasive resource deficiencies, notably in laboratories and technology. Despite high confidence in teacher competence, traditional pedagogies, often constrained by resource scarcity, impede the acquisition of practical skills. The study underscores an urgent need for targeted educational interventions that bridge this gap, fostering practical, skill-based learning and genuinely integrating youth perspectives into policy and practice.

**Keywords:** 21st-Century Skills, Educational Outcome, Ghana, Mixed Methods, Schooling, Youth Participation.

#### 1. Introduction

Globally, education is unequivocally recognised as a critical driver of national development, moulding human capital and equipping individuals with the requisite competencies for personal and societal transformation (Ghouse et al., 2024; UNESCO, 2023). This understanding is clearly articulated in Goal 4 of the United Nations Sustainable Development Goals (SDGs), which seeks to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. In alignment with this global educational framework, Ghana has implemented numerous

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educational policies, with the recent Free SHS policy aimed at improving access, equity, and the quality of educational outcomes (David, Andrews, 2022). This policy has increased enrollment rates, but quality outcomes have remained wanting. While youth constitute the majority of education beneficiaries, their involvement in policy and operational discourses concerning their education and training is often overlooked or not readily accessible for public scrutiny (Gupta et al., 2025; Hlungwani et al., 2021; Sanny et al., 2023). This issue is particularly pressing in many African contexts, including Ghana, where top-down policy formulation often prevails (Ampah-Mensah et al., 2024).

Youth appreciation of the educational system is essential because their viewpoints are shaped directly by firsthand experiences, and they are more likely to be influenced by their holistic involvement in learning. The relevance of policy, content, and delivery is hinged on the voices behind them. Theoretically, Becker (1964) and Schultz (1961)'s human capital theory, which posits that investment in human capital enhances an individual's productivity, contributing to economic growth and societal welfare, clearly establishes the general utilitarian value of education. Translating this into the classroom, Freire's (1970) critical pedagogy theory advances approaches that utilise education as a tool to empower learners with the knowledge and skills needed to facilitate societal transformation. Research consistently demonstrates that a supportive educational system focused on creating future economic opportunities for youth positively influences their engagement and satisfaction with the system (Lambon-Quayefio et al., 2023; Prodanova, Kocarev, 2023). Consequently, it stands to reason that if youth feel connected to their education system and if educational policies are in sync with learners' aspirations, addressing their current needs while empowering and preparing them for future opportunities, students are more likely to participate actively in the learning process.

Despite the wide availability of information in the current digital and artificial intelligence (AI) era, which offers numerous avenues for reaching out to young people, many remain disengaged from the policy formulation and implementation processes that shape their education (Vetrivel et al., 2024). Manu et al. (2024) suggested that a technological revolution might lead to meaningful youth engagement in educational policy formulation in Ghana. However, Ampah-Mensah et al. (2024) indicated that the prevailing old system, characterised by a top-down approach in which educational policies emanate from bureaucratic structures at the top of the hierarchy, still suppresses the invaluable contributions of youth. Undoubtedly, an educational system that disregards the voices of its primary stakeholders is prone to failure, as it may fail to align with future global trends and realities. Rodrick (2024) argued that limited youth participation in policy processes and procedures could lead not only to apathy but also to the underutilization of educational resources, thereby widening the lacuna between policy goals and desired educational outcomes.

Empirical literature indicates several hindrances to educational effectiveness in Ghana, including inadequate infrastructure, teacher attrition, insufficient attention to practical and technical education, and a mismatch between the curriculum and labour market demands (Addae-Kyeremeh, Boateng, 2024; Antwi-Boampong, 2024; Awuah, 2024). These challenges, recounted by practitioners – i.e., faculty and teacher trainees – were not adequately addressed in the new curriculum, nor in individual studies, and failed to capture the voices of learners in general (Addae-Kyeremeh, Boateng, 2024; Antwi-Boampong, 2024; Awuah, 2024). Moreover, each of these studies focused on a specific level of Ghana's education system without examining learners' experiences across different levels within the same system. This creates a gap in how the affected, i.e., learners, experience the education offered and how they perceive it in fulfilling its utilitarian and empowering roles, both presently and in the future. To this end, this study aimed to understand the perspectives of Ghanaian youth on their overall educational experience, from primary to tertiary level. Particular interest is given to the school environment and the pedagogic experiences of the student youth. The insights gained were intended to serve as *prima facie* evidence for policymakers to target educational interventions that are directly responsive to the needs and aspirations of the youth. The research question guiding the course of the study is: "What perspectives have youth formed regarding schooling and the pedagogical environment within which they access schools in Ghana's education system?"



## 2. Literature Review

This study is fundamentally grounded in the theoretical frameworks of human capital theory and critical pedagogy, which offer valuable lenses through which to examine Ghana's youth engagement in their schooling. Human capital theory, pioneered by economists such as Becker (1964) and Schultz (1961), posits that educational investments enhance individuals' productivity, thereby contributing to economic growth and societal well-being. This perspective is particularly relevant to Ghana's context, where policies such as the Free Senior High School (SHS) initiative aim to enhance access, equity, and educational quality (David, Andrews, 2022). By improving educational outcomes, these policies seek to develop the human capital of Ghana's youth, equipping them with the skills and competencies necessary for personal and national development. The extent to which youth in Ghana perceive these policies as aligned with their needs and aspirations is crucial, as their perceptions can significantly influence their engagement, academic performance, and contributions to society.

Critical pedagogy, as advanced by Freire (1970), provides a complementary lens by emphasising the transformative potential of education. This theory views education as a tool for empowerment, social justice, and challenging oppressive structures. In applying critical pedagogy to the context of Ghana, one would seek to explore how the nation's education system empowers or disempowers youth in general. More critically, it examines the extent to which the education system transitions youth into functioning adults who are responsible and contribute to meaningful national development through the skills and knowledge they acquired during schooling. The prospects of education are not evident only at post-completion, but also during the period of schooling, making the learner's perspectives critical to the schooling process. It is to this that Anyidoho et al. (2012) argued that policies that do not adequately consider the perspectives of young people can be less impactful and may not effectively address their needs. Therefore, understanding youth perceptions is crucial for ensuring that educational policies are relevant, responsive, and empowering, ultimately fostering greater engagement and ownership of the learning process among young people in Ghana.

Integrating human capital theory and critical pedagogy provides a robust theoretical framework for this study. While human capital theory emphasises the importance of education in developing a productive workforce and driving economic growth, critical pedagogy underscores the need for education to be empowering, equitable, and responsive to the needs and aspirations of young people. This dual perspective aligns with the study's aim to assess the perspectives of youth on the schooling they access in Ghana's education system and to advocate for their voices to be central in educational policy formulation. By prioritising youth participation, this research seeks to bridge the gap between policy intentions and practical educational outcomes, contributing to a more agile and focused education system in Ghana.

The essence of youth engagement in public policy formulation and implementation is widely recognised. Policy credibility is predicated on the involvement of all relevant stakeholders from the inception of policy framework formulation to its implementation and institutionalisation. Flodgren et al. (2024) suggest that youth involvement in policy formulation enhances democratic practices and promotes the development of young people. However, they found that the extent of youth involvement in policy formulation is often unknown, highlighting inadequate deliberate efforts to bring youth to the policy table.

Aman (2021) critically analysed the policy formulation and implementation of the Ethiopian Youth policy. The analysis focused on enabling legislative instruments, organisational structure, and processes. It concluded that the policy document failed to provide for youth inclusion in decision-making procedures for policy implementation. Evidence suggests that youth participation is a valuable tool for encouraging young people to engage in public life and contribute to development. Borodin and Kalashnyk (2020) emphasise the role of youth participation as a public policy instrument in Ukraine. Similarly, studies across contexts, such as those by Shafique (2024) in Pakistan and Boldt et al. (2021) in Europe, highlight a positive correlation between meaningful youth engagement and the effectiveness and legitimacy of public policies.

Challenges of youth involvement in policy formulation and implementation. In Nwafor-Orizu et al.'s (2018) study, intolerance and conflict, corruption, strong individual factors, inadequate resources, broad policy scope, and continuity deficiency problems emerged as critical hindrances to youth participation in policy formulation and implementation. To mitigate these challenges, the

researchers proposed, among others, citizenry orientation, sensitisation, and ideological social engineering to correct misconceptions among the youth. They also suggested that policy continuation should be encouraged without recourse to partisan politics. In another study by Titigah et al. (2023), political polarisation and the lack of formalised channels were highlighted as barriers to youth voice in Ghana's educational reforms. The importance of participatory actions in promoting the educational outcomes of youth, as asserted by Ahmad and Islam (2024), is indisputable if Ghana's Education Strategic Plan (2018-2030) are to be achieved (Abreh, 2025).

### 3. Methods

#### ***Research Design***

This study employs a concurrent mixed-methods design, which involves the simultaneous gathering of quantitative and qualitative data (Deshmukh, Cornman-Homonoff, 2023). This dual approach was chosen for its strength in providing an understanding that has both depth and breadth of the issue under discussion (Deshmukh, Cornman-Homonoff, 2023; Gläser-Zikuda et al., 2024), allowing for a comprehensive analysis and the formulation of well-informed recommendations for educational policymaking.

#### ***Study Setting and Participants***

Considering Ghana's diverse ecological landscape, the study drew participants from its three distinct zones: Savannah, Forest, and Coastal. A multi-stage, stratified purposive sampling approach was utilised to select two municipalities within each zone. From each municipality, three schools and one focus group of out-of-school youth were chosen. Participants for the qualitative focus groups included a purposive sample of Junior High Schools (JHS), SHS, and out-of-school youth to capture varied experiences. Schools were selected from three levels of schooling: JHS representing the basic level, SHS representing the secondary level, and out-of-school youth (recent tertiary graduates currently engaged in national service). The target population comprised youth enrolled in JHS and SHS, and those undertaking national service. This geographical spread and the selected levels ensured that regional differences and commonalities in the educational experiences of the target population were captured. The three key demographic groups targeted in this study typify the three levels of Ghana's school-going age youth, namely, 13-15 years (JHS), 16-18 years (SHS), and 19-22 years (tertiary graduates). This allowed for insights into experienced events, both current and future, of schooling, as well as the applicability of content learned in school to work engagement.

In summary, a more detailed description of the participants' demographic characteristics is provided, explicitly mentioning the age ranges for JHS, SHS, and tertiary graduates, as well as the geographical spread across Ghana's ecological zones. Additionally, confirmation of gender balance in the sampling is noted (See the distribution in Table 1).

The study's participant demographics reveal a well-distributed sample across educational levels and geographical regions in Ghana. The JHS and SHS students were surveyed, with JHS showing slightly higher female representation and SHS showing slightly higher male representation. Critically, student participation was notably balanced across the Coastal, Forest, and Savannah zones for both educational stages. Age-wise, the JHS group primarily consisted of younger adolescents, while the SHS cohort largely comprised older teenagers, reflecting the typical age progression through Ghana's secondary education system.

The out-of-school youth participants, comprising recent tertiary graduates, were a diverse group of 120 individuals. Of this qualitative sample, 58 (48.3 %) were female and 62 (51.7 %) were male, ensuring a close gender balance. Their ages ranged from 19 to 24, with a mean age of 20.5 years. The group was purposively sampled from all three ecological zones to capture a broad range of post-secondary experiences and to provide regional perspectives on the link between education and employment.

#### ***Ethical Considerations***

The study has been framed and implemented within the remit of an ethically sound ethos, and consistent with national research protocols for pre-tertiary institutions in Ghana. Approval for this study was obtained from the Ghana Education Service, as per GES/DG/247336/24/037, on January 16, 2024. All participants provided informed consent prior to the collection of data. For participants under 18 years of age, guardian consent was obtained, in addition to the assent of

the minors themselves. Confidentiality and anonymity were maintained throughout the study, and participants were assured of their right to withdraw at any time without penalty.

**Table 1.** Distribution of youth participants by demographics and schooling level

Variable	Category	Level of Education			
		JHS		SHS	
		Frequency (n)	Percent (%)	Frequency (n)	Percent (%)
Gender	Female	554	57.3 %	224	46.4 %
	Male	409	42.2 %	258	53.4 %
	<b>Total</b>	<b>968</b>	<b>100.0 %</b>	<b>483</b>	<b>100.0 %</b>
Zone	Coastal	322	33.2 %	159	32.9 %
	Forest	323	33.4 %	162	33.5 %
	Savannah	321	33.2 %	161	33.3 %
	<b>Total</b>	<b>968</b>	<b>100.0 %</b>	<b>483</b>	<b>100.0 %</b>
Age Group	12 and below	19	2.0 %		
	13–15	737	76.1 %		
	16–18	185	19.2 %		
	18+	27	2.7 %		
	<b>Total</b>	<b>968</b>	<b>100.0%</b>		
	15 and below			10	2.0 %
	16–18			379	78.5 %
	19–21			84	17.5 %
	21+			10	2.0 %
	<b>Total</b>			<b>483</b>	<b>100.0 %</b>

### ***Sampling and Data Collection***

The quantitative approach utilised surveys administered to 968 JHS students and 483 SHS students, resulting in a total of 1,451 student participants. The qualitative approach, involving focus group discussions (FGDs), engaged 120 youth comprising a purposive sample of in-school [made up of JHS students {sample size of 48 with 3 FGDs per zone}, SHS students {sample size of 48 with 3 FGDs per zone}, and out-of-school {sample size of 24 with an FGD per zone}] (Sarfo et al., 2021). This sample size was carefully determined to ensure statistical validity for the quantitative data while remaining manageable for in-depth qualitative analysis. Although gender was not a primary focus, meticulous effort was made to ensure gender balance in the sampling of respondents, thereby reflecting the diverse experiences of students.

The survey instrument was a structured questionnaire designed to capture a wide range of data points on perceptions of the education system's purpose, the conduciveness of the learning environment, and pedagogical effectiveness. The questionnaire was developed based on the study's research question and objectives, drawing insights from existing literature on youth education and policy. Focus group discussions were employed to delve deeper into emerging and questionable themes identified from the survey data, allowing participants to share personal experiences, nuanced opinions, and collective perspectives in a more conversational and interactive setting. Focus group discussions were employed with a subset of both in-school and out-of-school youth to delve deeper into emerging and questionable themes identified from the survey data, allowing participants to share personal experiences, nuanced opinions, and collective perspectives in a more conversational and interactive setting. A semi-structured discussion guide was used to facilitate these discussions, ensuring consistency across groups while allowing new themes to emerge.

Data collection was carried out by a team of trained research assistants between February and March 2024. They utilised digital tools for efficient data recording, following a structured protocol to ensure consistency and accuracy. All data was securely stored and accessible only to the research team.

### **Data Analysis**

Collected data underwent rigorous analysis. Quantitative survey data were analysed using IBM SPSS Statistics Version 25 for Mac, employing descriptive statistics (frequencies and percentages) to identify patterns and trends in youth perceptions (Abreh, 2015; Loeb et al., 2017). Qualitative FGD data were subjected to thematic analysis. This involved transcribing the discussions, coding the data, and identifying recurring themes and patterns related to youth experiences and perspectives on schooling. To maintain the zonal identities of the data, pseudonyms were used to delineate the sources by their categories as references for quotes. For example, the first basic school selected in this study for the FGD in the Forest zone is given the pseudonym, Forest JHS 1. This comprehensive approach enabled the identification of statistical patterns and trends, alongside rich and unique insights, considered essential to understanding the multifaceted perspectives of youth and to informing robust policy recommendations. To validate the findings from the data, a stakeholder workshop was held that brought together young people, government representatives, and other stakeholders to confirm the experiences and expectations of the youth.

### **4. Results**

This section presents the study's results and findings from the data gathered through surveys and focus group discussions, addressing the research question: "What perspectives have youth formed regarding schooling and the pedagogical environment within which they access schools in Ghana's education system?" The objectives were to assess the perceived strengths of the educational system, the challenges hindering it, and proposed strategies for mitigating these challenges. Through the lens of youth's lived experiences of schooling in Ghana, two overarching themes emerged from the data: youth's perspectives on schooling in Ghana and the conduciveness of the school environment to attain their schooling aspirations. Drawing on quantitative and qualitative data, the following section aligns the supporting themes with their related major themes. Representative examples and quotations are provided, where necessary, to illustrate the respondents' voices.

#### **Youth Perspectives on Schooling in Ghana**

The data categorise the youth's perspectives on schooling in Ghana under two main sub-themes: the purpose of schooling and participation in schooling. According to the survey, 95 % of the SHS student respondents indicated that their schooling aims to produce future leaders (60 %), prepare children for the world (28 %), and primarily create an environment for learning (7 %).

Data from the FGD revealed more diverse perspectives on schooling by the different categories of respondents. From the basic education level, respondents perceive the purpose of schooling to include a space to "... *explore individual talents*" (Coastal JHS 1, March 2024) and to develop assertiveness and discipline among learners. Respondents from the SHS perceived the central purpose of schooling in Ghana as a platform for acquiring essential skills that would prepare them for work and enable them to assume leadership positions for social change and transformation. For instance, with a pointer to leadership, one of the students indicated, "*I want to become the president of the country, and for the country to develop, I have learnt about natural resources and how to use them...*" (Savannah SHS 1, March 2024). This view represents a realistic, purpose-driven perspective on schooling. Similarly, another student indicated "*to gain leadership skills*" (Coastal JHS 2, March 2024). The out-of-school youth, as recent tertiary graduates, confirmed the views of the SHS respondents, indicating that education helps them acquire specific professional skills, such as mechanical engineering, agriculture, and teaching, to increase their chances of being gainfully employed and of impacting society.

Some contradictions, however, were expressed regarding the opportunities that schooling in Ghana offers. According to some youth, Ghana's educational system offers "... *a lot of subjects to allow students to identify their talents*" (Coastal SHS 2, March 2024); yet for its thick theoretical leaning, the nation's "... *educational system is*", considered as, "*restricting, without making room for students to explore their talents*" (Forest SHS 2, March 2024). According to one FGD, schooling in Ghana is "*Bad ...*" since "*there is less research on the part of the learners*" (Coastal JHS 2, March 2024). From this thick-theoretical impression, participants in the FGDs contended that "Ghana's {educational} system categorises {prioritises} intelligence {cognitive skills}" (Savannah SHS 1, March 2024); thus, the concern that Ghana's "Education is just trying to train people to



become lawyers, doctors without making any efforts to develop technical and vocational skills” (Coastal SHS 2, March 2024). This fixation to train students for the academically traditional professions impressed some students to find schooling in Ghana to be *“Both inspiring and boring with little focus on creating a future”, meaning a lack of interest in developing a variety of possible futures that include the practically oriented trajectories. In fact, the emphasis on some courses has resulted in “Some people looking down on the courses pursued by some students”* (Savannah SHS 2, March 2024). Quantitatively, the curriculum was considered “very relevant” by 48.13 %, 20.86 %, and 20.75 % of respondents from the Coastal, Forest, and Savannah zones, respectively. Deviating slightly from the focus of schooling, one FGD asserted that Ghana’s “schools are biased toward girls and give them too many preferences” (Forest SHS 2, March 2024).

### ***Youth’s Perspectives on the Conduciveness of the Environment for Schooling***

Under this central theme of the conduciveness of the environment, the paper addresses the issue from two sub-levels: the physical environment, including teaching and learning resources, and the responsiveness of teachers’ pedagogical skills to students’ needs. First, regarding the physical or built environment, the students’ feedback is presented in [Table 2](#).

**Table 2.** Perception of school environment conduciveness for teaching and learning

Response	Student Category	
	JHS	SHS
Very conducive	63 %	54 %
Conductive	27 %	35 %
Not conducive	5 %	9 %
Not sure	5 %	2 %

Quantitatively, more than 50 % of the respondents from both JHS and SHS agreed that a very conducive schooling environment exists. However, further analysis revealed that these learning environments are deeply constricted in resources and the prevalence of traditional learning approaches.

As the major human resource responsible for delivering the curriculum content, the adequacy of the number of teachers and the responsiveness of their pedagogical skills to the students’ educational needs were two major issues raised regarding the sufficiency of resources. The outlook on the issue from a country-level perspective revealed that more than half of the respondents, notably 70 % from the Savannah, 61 % from the Coastal, and 56 % from the Forest zones, reported inadequate teaching staffing. Relatedly, youth participants believed their teachers possessed the necessary skills to execute their teaching tasks effectively. This is evident, for example, in the fact that the majority (83 %) of JHS respondents found the pedagogical skills of their teachers to be “very appropriate.” Very few respondents found their teacher’s teaching either “not appropriate” (1 %) or “not sure” (1 %).

This confidence in teachers’ pedagogical skills was also confirmed in the FGDs, where one group expressed that their teachers are “... well trained and they teach us many things ...they are our role models (Coastal JHS 4, March 2024). Similarly, another group said, “teachers help to teach to the understanding of all. Teachers have made us great. We have met very nice teachers who have greatly impacted our educational journey and experiences” (Coastal JHS 3, March 2024). A downside in students’ experiences with teachers was that respondents reported other teacher-related issues, including 16 % teacher absenteeism, 15 % insufficient teacher numbers, and 14 % inadequate contact hours. For FGD, however, “... some teachers have not lived up to expectations and they can beat us too much” (Coastal JHS 3, March 2024). The out-of-school youths generally agreed with these findings (*Coastal/Forest/Savannah NSS FGD, March 2024*)

The staffing of teachers was not the only limitation experienced by the youths, but also the requisite teaching and learning resources for effective lesson delivery. According to the survey, 67 % of the youth indicated that insufficient resources were a major problem that confronted Ghana’s school system. In confirmation, the FGDs revealed different ways the school environment faced resource scarcity. From one of the FGDs, the youth articulated that *“our greatest challenge is insufficient learning resources”* (Forest JHS 1, March 2024). Giving a breakdown, one FGD group

expressed that the insufficient resources they cry about include “... *textbooks, no science and ICT Laboratories, etc.*” (Coastal JHS 4, March 2024); and “... *certain facilities such as libraries in our school*” (Forest JHS 2, March 2024). Students in the Savannah zone specifically viewed these inadequate resources as a result of parents’ inability to provide basic needs, such as textbooks, exercise books, and notebooks.

The effects of this shortage are enormous, as its ripple effects have been experienced in diverse aspects of the youth’s schooling experiences. Within the space of pedagogy, it emerged strongly from the FGD sessions that teachers adopt teacher-centred approaches, which are characteristically more lecturing than practice-oriented or interactive and are often thick in theory rather than applications. For instance, discussants from one of the FGDs revealed, “*Teaching and learning is teacher-centred. Our learning process is also theoretical all the time. We do not have more practical sessions during learning*” (Forest JHS 3, March 2024). This creates “*the monotonous ways of teaching make learning theory-based and stressful, and I wondered whether specific courses were needed in the first place*”. There is an excessive amount of theory-based content with a minimal practical component. The out-of-school youths could confirm that (Forest NSS FGD, March 2024)

“*The education system is more knowledge-based (typical of memorisation and recall strategies) than skill-based*” (Coastal SHS 1, March 2024). From the quote, the overutilization of the teacher-centred approach creates a monotony that makes the teaching and learning process boring, and in some cases, fails to establish the significance of certain course content; thus, the FGD participants’ questioning of the need for some courses. Content-wise, it also emerged from the FGD with the SHS that the “... *practical component of courses is too small* (Coastal SHS 2, March 2024). Buttressing the stress on theories, it was expressed in one FGD that “... *my program is vocational and technical, which is supposed to be purely practical oriented. In General Science, the teaching is the same, and practical work is limited. We don’t have the practical materials to work with, and we have not been to the lab before; everything is book...*” (Forest SHS 2, March 2024). Significantly, the non-practicality of schooling in Ghana is not limited only to the pedagogic stage, but according to one FGD, even “*Final examination is not practically based. Practical questions are set on paper for students to answer instead of doing the real experiments*” (JHS FGD, March 2024).

Regardless, the FGD expressed that participants, “*said get good grades but they are not fully prepared for the real world*” (Forest SHS 1, March 2024). This depicts either a lack of relevance of content to the real world or a lack of depth in schooling to translate into the real-world situation. In fact, another FGD response said, “*Education in Ghana is just exams oriented and does not create the platform for us to exhibit any practical skills. It also all about theory and not focusing on acquisition of skills. It’s just chew and reproduce*” (Forest JHS 4, 2024). This second quote reveals a situation of students lacking depth in content in terms of applicability rather than relevance of content, thus, ‘chewing to pass exams and forget’. In terms of literacy, the same FGD revealed that the absence of practicals, “*has affected our spelling abilities*” (Forest JHS 4, March 2024).

As an intervention to the limited opportunity for practical-based teaching, youth participants from both JHS and SHS levels indicated the desire for more take-home assignments from teachers. As illustrated by 99 % of JHS respondents, who indicated that teachers’ pedagogical skills are “appropriate” or “very appropriate,” students strongly desire teacher assessments through homework or project work to allow exposure to a variety of engaging ways to acquire multiple skills and capabilities.

Despite the challenges and issues raised regarding the schooling of youth respondents, the participants were not unaware of the benefits of schooling, even at the various stages they found themselves in. Health-wise, two FGD acknowledgements were made on “*personal hygiene*” (SHS, 2024); and due to having “... *health information, so I eat better and can perform CPR accurately*” (Coastal SHS 1, March 2024), and “... *administer first aid*” (Coastal JHS 4, March 2024). In terms of literacy, communication, and presentation, “*Knowledge in Fante {L1} language ... helps me to communicate orally and in writing well*” (Coastal JHS 1, March 2024). The out-of-school youth FGD group also asserted, “*We can write letters to seek employment and other forms of writing*” (Savannah NSS FGD, March 2024), just as another out-of-school youth FGD expressed that, “*Good communication skills, public speaking skills, self-confidence,*



*cooking skills improved, time management improved, roles and responsibilities of a citizen. How to create your own business, printing of T-shirts, designing of books, making of batik tie and dye” (Coastal NSS FGD, March 2024).*

In terms of numeracy, SHS youths indicated that they had developed the ability to calculate mathematical concepts, basic accounting principles, and acquired art skills (Savannah SHS, 2024). For science, vocational, and technical subjects, some knowledge and skills that youths expressed they have gained from schooling and are currently applying include “*rearing of animals learnt in science and how to administer first aid*” (Forest SHS 2). For others, the skills include sewing, using technological devices, electricity, and animal husbandry, which are learned in science. In one example, the youth FGD asserted that, “*Mathematics has helped us to produce robots, cars, etc.*” (Coastal SHS 2, March 2024). Socially, the host of values and attitudes youths referenced as having acquired from Ghana’s schooling system included self-examination, tolerance, teamwork, creativity, hard work, time management, comportment, punctuality, and the ability to resolve conflicts.

With such gains already made, respondents expressed high confidence in the schooling they were receiving or had received. This is apparent as 99 % of SHS students expressed confidence in the education system. Specifically, 98 % indicated that they were “confident,” with 2 % indicating “very confident” in the schooling they accessed in Ghana. One percent of the respondents, however, indicated that they were either “not confident” or “not sure” about their schooling in Ghana.

The findings reveal a wide range of perspectives, representing both positive and negative opinions and experiences, ascribed by youths on schooling in Ghana and the conduciveness of the environment for effective schooling. The data, however, revealed either stronger or overwhelming biases toward the positives, indicating that, regardless of the negatives, the youth do not entirely find their education irrelevant. With the identification of benefits from the school system at their various stages, the youth definitely find prospects in their schooling. However, this does not imply that they are oblivious to challenges that, in their estimation, would have widened and diversified their opportunities.

## 5. Discussion

The overall purpose of education in Ghana, as perceived by the youth, is to produce responsible, aspiring individuals for work and leadership positions, and to prepare them for the world. Without resorting to the instrumental view of attending school to satisfy their parents and guardians, youth actively expressed their perspectives, reflecting their participation in education as well as the constricted prospects they are likely to confront in the future. Indeed, without losing sight of the ideals of employment, civic responsibility, and leadership in the country, the youth’s accounts also echo cries to be saved from a potential future that could be foiled by not being heard and taking the necessary action immediately. The active expression of youth’s understanding of the overall purpose of their education, vis-à-vis the ideal output/outcomes within the constricted schooling spaces, reveals a profound sense of readiness and capability essential for meaningful engagements in decisions that shape their lives and their country’s future. Without much ado, policymakers and implementers are therefore presented with willing youth who seek to offer their experiences as direct beneficiaries of schooling in Ghana for the necessary interventions.

The positive perception of the environment’s conduciveness suggests a generally positive outlook on Ghana’s schooling environment. However, the issue of resource constraints, as experienced by the youth, was not addressed in their responses. Resonating with Prodanova and Kocarev’s (2023) argument that a supportive system focused on creating more future economic opportunities for youth directly impacts their engagement and satisfaction with the education system, the place of adequate teaching and learning resources cannot be overlooked. A conducive environment possessing the requisite attributes – both physical, psychological, and emotional – promises to boost youth confidence and active participation in their education and other engagements. This aligns with Abreh (2025) and Ahmad and Islam’s (2024) support for participatory development theories that not only emphasise pleasant physical spaces, but genuine inclusion and empowerment. From the findings, however, environments perceived as positive often presented deeper issues regarding resource constraints, which could be detrimental to future opportunities. A major implication here is that the government, in conjunction with relevant stakeholders, including the youth, must explore avenues to ensure the sustainable provision of educational resources across all levels of Ghana’s schooling system.

Despite the positive perceptions of teachers' pedagogic prowess, the observed lack of practical application points to a system-level challenge related to curricular design and implementation, which highlights, among others, issues of time and physical space, as well as the availability and usage of teaching and learning resources in places where they are available. Interventions specifically targeted at addressing issues related to teaching and learning resources can resolve the disparities highlighted by Baffoe et al. (2021) and Ewulley et al. (2023) in terms of supplies and usage between urban and rural contexts. Further in the findings, the compelling matter is the formed mindset of both school service providers and students, focusing on passing examinations, after which the redundancy or lack of usage of knowledge and skills is left with the learner. Either by intention or not, the youth are convinced that the absence of teaching and learning resources is a major rationale for the examination-focused approach by schools.

The insights from the out-of-school youth group, in particular, highlight the profound impact of this theory-practice gap. The assertion that even schools with resources do not see teachers utilising them further questions the seriousness with which school authorities relate the content to real-life situations, and by extension, helps students connect more with the content. A school system that seems to have lost this sense of duty, however, is enrolled with students who are very much aware of and desire the ideal. Out-of-school youth who find themselves at the end of the continuum, fortunately, find a linkage between their schooling and their work, although they express that their schooling could have offered them more. Such benefits in schooling were not lost to youths at the JHS and SHS levels, for even what they can currently do. Yet, it was overwhelmingly clear that there was more in the youth; they felt their schools could have unearthed and developed if practical components were equally attended to.

In conclusion, youth in schools in Ghana currently perceive their education provision as a mixed bag of foundational awareness and aspirational purpose, although fundamentally hampered by resource deficits that dictate the theoretically laden pedagogic approaches. This failure in the environment, however, has not quenched the fire in the youth, as they remain hopeful and, with the help of their teachers, strive for higher aspirations. Bridging the gaps highlighted in the findings would require concerted efforts, but not without the youth, who can best express, beyond examination results, their experiences and the extent to which interventions are responsive to their needs.

## **6. Strengths and Limitations of the Study**

### ***Strengths of the Study***

This study makes several significant contributions. Firstly, its concurrent mixed-methods design offers a robust and comprehensive understanding of youth perceptions, combining the breadth of quantitative survey data with the depth of qualitative focus group discussions. This triangulation of data sources enhances the validity and richness of the findings. Secondly, the study's focus on youth voices is a critical strength, as this demographic is often underrepresented in educational policy discourse, particularly in African contexts. By prioritising their perspectives, including those of recent tertiary graduates, the research provides direct, lived experiences that are invaluable for informing relevant and responsive policy reforms. Thirdly, the wide geographical spread across Ghana's diverse ecological zones (Savannah, Forest, and Coastal) and the inclusion of participants from different educational levels (JHS, SHS, and out-of-school youth/tertiary graduates) ensure a more representative understanding of youth experiences nationwide, capturing both regional specificities and commonalities. Finally, the stakeholder validation workshop, held after data analysis, further strengthens the credibility of the findings by involving key actors – including the youth themselves – in confirming the experiences and expectations reported.

### ***Limitations of the Study***

While valuable, the study has certain limitations. Firstly, the cross-sectional design captures perceptions at a single point in time, preventing causal inferences or the tracking of longitudinal changes in youth perspectives over time. Future research employing longitudinal designs could provide deeper insights into the evolution of these perceptions. Secondly, while the mixed-methods approach offers depth, the specific sample selection means the findings, though regionally diverse, may not be fully generalizable to all diverse youth experiences across Ghana, especially those in highly remote or specialised educational settings not covered. Future research should consider

broader stakeholder engagement beyond youth for an even more comprehensive understanding of the educational system's challenges and opportunities.

## 7. Conclusions and Recommendations

In conclusion, this study reveals the complex and often contradictory perceptions of Ghanaian youth regarding their national education system. While they hold profound aspirations for education to serve as a transformative force for personal advancement, securing future employment, and contributing to national development, their lived experiences are significantly shaped by a system perceived as fundamentally theoretical and constrained by pervasive resource deficits. This persistent disjuncture between aspirational purpose and current practice represents a critical challenge, diminishing the system's effectiveness in preparing them for the demands of the 21st century.

The findings unequivocally underscore the urgent imperative for policymakers to genuinely incorporate learners' direct insights and perspectives, moving beyond mere quantitative metrics to truly understand the impact and responsiveness of educational interventions. Without this critical feedback loop, Ghana risks perpetuating an educational model misaligned with the very future it aims to build. Based on these conclusions, the following recommendations are put forth for consideration by policymakers and educational stakeholders in Ghana:

**Curricular Overhaul for Practical Skill Integration:** A fundamental overhaul of the existing curriculum is unequivocally recommended to bridge the identified purpose-practice gap. This transformation must extend beyond superficial updates, focusing instead on a comprehensive framework that rigorously integrates practical, vocational, and essential life skills across all learning stages. Such curricular reform should prioritise experiential and project-based learning, foster critical thinking, and encourage problem-solving abilities, thereby directly aligning educational outcomes with the dynamic demands of both local and global labour markets. Furthermore, collaborative partnerships with industry and vocational training institutions could provide invaluable real-world exposure, ensuring the curriculum remains relevant to Ghana's evolving economic landscape and empowering youth to pursue entrepreneurship and innovation.

**Equitable Investment in Educational Infrastructure and Resources:** Addressing the severe environmental constraints is equally vital for fostering a truly effective learning ecosystem. Despite youth's general perception of school environments as conducive, qualitative data consistently highlight critical shortages in essential learning resources, notably modern science and ICT laboratories, adequate libraries, and up-to-date teaching materials. This pervasive scarcity directly limits hands-on learning experiences and hinders the development of digital literacy, thereby perpetuating a reliance on theoretical instruction. Therefore, substantial and equitable investment in educational infrastructure is paramount at all levels of schooling and across all geographical zones. Strategic public-private partnerships should be actively pursued to ensure the consistent provision and sustainable maintenance of these vital resources, creating genuinely conducive and stimulating learning environments for every Ghanaian student.

**Enhancing Teacher Pedagogical Approaches:** While teachers are widely recognised for their inherent pedagogical skills, the study reveals a persistent reliance on traditional, teacher-centred methodologies, often a practical consequence of large class sizes, limited resources, and an examination-driven culture. To counteract this, comprehensive and ongoing professional development programs for teacher educators are crucial. These initiatives must transcend one-off workshops, focusing on equipping educators with modern, student-centred, and technology-integrated pedagogies, such as inquiry-based learning, collaborative projects, and blended instruction. Empowering teachers with these skills will enable them to utilise available resources creatively, foster deeper student engagement, cultivate critical thinking, and transition learning beyond rote memorisation, thereby transforming classroom dynamics and improving educational outcomes.

**Institutionalising Meaningful Youth Participation:** Crucially, the documented limited youth participation in the very policy processes that shape their education signifies a substantial missed opportunity for genuine reform. Despite the vast potential of the digital age for inclusive engagement, youth voices remain largely unheard or unheeded in the policy formulation and implementation process. To foster a truly responsive and effective education system, it is imperative to establish precise, formalised, and accessible channels for meaningful youth involvement. This includes creating youth advisory councils, implementing digital feedback

platforms, conducting youth-specific town halls, and integrating student representation at various levels of educational governance, thereby enhancing policy relevance, securing greater buy-in, and nurturing active civic participation.

In essence, the study's findings collectively necessitate a systemic and holistic transformation of Ghana's education landscape. This monumental endeavour demands a concerted, multi-stakeholder effort – involving government, educators, communities, industry, and critically, the youth themselves– to fundamentally redesign curriculum, bolster resources equitably, revolutionise pedagogical approaches, and institutionalise genuine youth participation at every level. By proactively addressing these identified gaps and placing the aspirations and lived experiences of its young population at the very core of educational reform, Ghana can cultivate a more dynamic, relevant, and globally competitive education system, thereby unlocking the full potential of its human capital for sustainable national development and a prosperous future.

## 8. Declaration

### ***Ethics approval and consent to participate***

The study was conducted in accordance with the Declaration of Helsinki and was approved by the Ghana Education Service, as per GES/DG/247336/24/037, on January 16, 2024 and the study was conducted in accordance with the (1) Code of Conduct: *Principles for integrity – the underlying ethics for achieving our goals*, and (2) *Child Protection Guidelines of the Fondation Botnar*.

### ***Consent for publication***

All authors have reviewed and approved the final version of the manuscript for publication.

### ***Informed Consent Statement***

Informed consent was obtained from all subjects involved in the study. For participants under 18 years, informed consent was obtained from their legal guardians/parents.

### ***Conflicts of Interest***

The authors declare no conflicts of interest.

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### ***Authors' Contributions***

All authors (M.K.A., L.E.X., M.E.A., C.A.M., J.S.D., R.K.A) contributed to the conceptualisation, methodology, data collection, writing – original draft preparation, and review management and editing. The quantitative analysis was overseen by M.K.A., J.S.D., R.K.A. In contrast, the qualitative analysis was done by L.E.X., M.E.A., C.A.M., and the manuscript preparation was supervised by M.K.A. of this manuscript. All authors have read and agreed to the published version of the manuscript.

### ***Data Availability Statement:***


The data presented in this study are available on reasonable request from the corresponding author.

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## Analysing Positional Efficiency of Winning and Losing Male Handball Teams of National Colleges of Education Sports Association (COESA) Games – Kumasi, 2022

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### Abstract

The aim of this study was to analyse the positional efficiency of winning and losing men's handball teams that participated in the National Colleges of Education games held at Kumasi in 2022. Five handball teams, one from each zone, participated in the tournament, which was on an "all play all" basis, each team playing four matches. Data were collected on 12 different positional efficiency variables using observation and videotape. An independent sample t-test (two-tailed) was used for analysis. Results showed that, of the 12 positional efficiency variables compared, there was a statistically significant difference for Wing Attack Shots Unsuccessful,  $t(1) = 1.00$ ,  $p = .005$ , Fast Break Shots Unsuccessful,  $t(1) = -5.46$ ,  $p = .002$  and Total Shots Saved by Goalkeepers,  $t(1) = 7.14$ ,  $p = .003$ . These three positional efficiency variables primarily contributed to the differences between the teams, placing one far ahead of the others and ultimately determining the tournament winner. Meanwhile, the researchers can conclude that goalkeeping was also a significant factor in determining the game's results. Although there was no significant difference, the mean values for goalkeeping in winning teams were higher than those in losing teams. In effect, teams with good goalkeepers, who make many saves in games, are likely to win their matches. Coaches are therefore encouraged to focus more on improving areas where their teams are most efficient and to adequately prepare their goalkeepers before competitions.

**Keywords:** Positional efficiency, Team handball, Team performance, Technical play, Transition of Play.

### 1. Introduction

Team Handball is a highly technical and tactical game that requires players to execute various tactical manoeuvres, including running at top speed with intermittent jogging (Fransson et al., 2018; Struzik, 2020). All these technical and tactical actions are aimed at enhancing a team's chances of winning a particular game. The Colleges of Education Sports Association comprises all 46 public Colleges of Education in Ghana and organises biannual games, rotated among the five zones. The organisation of the Colleges of Education Games is such that, due to the limited number of colleges in a particular region, colleges from two regions combine to organise competitions and form a team to represent the two regions at the national games. Thus, the Central and Western

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Regions combine to make a team known as CENWEST, the Ashanti Region and Brong Ahafo Regions combine to form ASHBA, the Eastern and Greater Accra Regions combine to form EGA, the three northern regions Northern, Upper East, and West also combine to form NORTH and because the Colleges in the Volta Region were quite a good number it stands as one zone known as VOLTA.

It is worth noting that this occurred when Ghana had ten regions. At the games, men and women compete in various sporting activities for medals. The categories of sporting events are athletics, handball, netball, volleyball, and soccer. Past game records indicate that in handball, the game of interest in this study, ASHBA, CENWEST, and VOLTA have consistently dominated the first three positions for a long time. At the same time, EGA and NORTH have also occasionally performed well, as noted in the 2022 COESA Report.

Structural efficiency indicators in hierarchically organised games can be derived from dimensional, zonal, or positional analyses of players (Gryko et al., 2018). This is primarily a combination of factors that do not stand alone but are interrelated, each building on the others for a successful game analysis. Key among them is the player's preparation capacity, specifically the handball player's preparation before and during competitions (Durlević et al., 2025). This primarily consists of the player's fundamental anthropometric characteristics, which serve as the basis for developing the specific abilities necessary for successful performance during play. In Ghana, few studies have been conducted to enhance handball players' performance (Apaak et al., 2021; Toshio, 2020). Most studies on handball players focus on fitness variables and other parameters, with very few centred on the technical and tactical aspects of the game. Additionally, in our part of the world, there is no established or unified method for collecting data during games.

This study precedes other similar studies that aim to establish certain standards for analysing handball games, particularly in the Colleges of Education and University handball competition settings in Ghana, due to their peculiar nature. Additionally, since very few coaches are willing to make time for such activities during competitions due to their cumbersome nature, the researchers have a view of simplifying them compared to the already established standards (McLean, Mallett, 2012). Observation and video tape analysis of matches play a key role in assessing players and games. This enables coaches to critically examine the games from the point of positional efficiency during play, and it goes a long way in making a comprehensive assessment and informed judgment at the end of games. There has been analysis to assess technical and tactical play during most of a game, but with positional elements of the game in mind, researchers hope to make it a comprehensive activity (Andrienko et al., 2019; Popovych et al., 2021). During the game, coaches and technical teams can record every successful and unsuccessful move players makes such as the total number of goals scored, from different playing positions, percentage use of six-metre shots, fast breaks, goalkeeper save per game, shots from seven-metre and also technical mistakes made like balls passed to opponents, poor defensive recoveries and many others (Mommert, König, 2024). That is how objectively positional indicators of games, as well as the efficiency of players and teams, can be measured. This minimises the subjective assessment of the conditions under which the coach or coaching staff can competently evaluate the contribution of each player in offence or defence to the success or failure of a particular player or the team (Mujika et al., 2018).

It also informs the coaching and technical staff about players who can fit and compete well in a particular game, as opined by Vuleta et al. (2015). The criteria used to assess the actual quality of handball players must provide a positional assessment of the success or effectiveness of the game by each player in relation to the positions of the various phases of the game. Various typical and atypical situations characterise the handball game during play, and for that matter, the need for an objective recognition of certain situations in the game and the parameters of positional effectiveness for each player in competitive conditions (Gryko et al., 2018). By this, we can obtain objective indicators of conditions or the efficiency of players and teams, ensuring that there is minimal or no subjectivity during evaluations.

This study aims to determine the differences between winning and losing male handball teams that participated in the 2022 national COESA games, using indicators of situational efficiency. The research questions which will help to achieve the objectives of this study are:

1. What are the indicators of positional efficiency that differentiated winning and losing men's handball teams during the COESA games in Kumasi 2022?
2. Did the contribution of individual indicators of positional efficiency in the game account for the winning and losing teams during the COESA games in Kumasi 2022?

## 2. Materials and Methods

### *Ethical Considerations*

Permission was sought from the National Executive of the Colleges of Education Sports Association (COESA), which has oversight responsibility for the games, and was duly granted before the competition. All team coaches and players were informed about the nature of the research and the mode of data collection, including the fact that it would not affect their play, and they provided consent for the researchers to collect the data.

### *Study Design and Rationale*

The study employed a descriptive cross-sectional survey design. This design is suitable because, unlike other observational designs, it offered the researchers the opportunity to achieve our aim of collecting data at a single point to establish preliminary evidence in planning future, advanced studies. Data were collected during the ten days of the games through live match observation and videotape. Four research assistants were placed at positions around the court, where observation would be easy, to use a checklist to assess situational performance during the attack. Two assistants were at different positions, checking for a team at a time. Meanwhile, all games were videotaped, so after each match, the researchers reviewed the footage to cross-check and confirm the data collected in real time.

### *Population and Sample*

The population of this study consisted of all games played by male handball players who participated in the 2022 edition of the National Colleges of Education games, hosted at the Kwame Nkrumah University of Science and Technology campus. There were five zones, each represented by 14 players; teams selected two players for each playing position. The total number of participants was 70 players aged 18 to 24 years, with a range of playing experience of 6 to 9 years. [Table 1](#) below shows the details of participants for each zone. All players had the opportunity to participate, as they either started the game or joined in as substitutes on many occasions.

**Table 1.** Participants' demographics

Zone	Number	Age	Playing	Playing Positions
ASHBA	14	19-23yrs	6-8yrs	2GK,2LW,2LB,2MB,2LP,2R
CENWEST	14	18-24yrs	7-8yrs	2GK,2LW,2LB,2MB,2LP,2R
EGA	14	19-22yrs	7-9yrs	2GK,2LW,2LB,2MB,2LP,2R
NORTH	14	19-24yrs	6-8yrs	2GK,2LW,2LB,2MB,2LP,2R
VOLTA	14	17-23yrs	7-9yrs	2GK,2LW,2LB,2MB,2LP,2R

Notes: GK-Goalkeeper, LW-Left Wing, LB-Left Back, MB-Middle Back, LP-Line Player, RB-Right Back, RW-Right Wing

### *Inclusion and Exclusion Criteria*

All matches played by the various teams were analysed. Players who played for various teams, regardless of the number of minutes played, were also included as long as they had an opportunity to go on an attack. The study aimed to analyse positional efficiency on attack; for that matter, no consideration was made of defence.

### *Measures*

The research assistants were trained using the checklist. The female group games were used for the training. The researchers took the assistants through data collection with the observation checklist during the female group games of the tournament. Additionally, a series of videotaped matches was shown to the research assistants for them to assess the various positional efficiencies during attack. The research assistants and the researchers were placed in vantage positions during each men's game for data collection. Two research assistants and one researcher collected data for each of the teams while they were on attack. All games were also videotaped, so after each day, the team of researchers reviewed the footage to confirm the data collected during the live matches. Because the games were played on an all-play-all basis, each team played four games, from which various positional efficiency parameters were recorded and analysed. The data concerning the number of successful shots (total number of goals scored) in the competition was confirmed by the

official results presented by the games secretariat. The table below presents the variables and their corresponding measurement methods.

**Table 2.** Variables and operational definition

<b>Variable</b>	<b>Code</b>	<b>Definition</b>
Six Metre Shots Successful	SMSS	Shots that were taken from just behind the six-metre line and scored
Six Metre Shots Unsuccessful	SMSU	Shots that were taken from just behind the six-metre line that were either thrown out of the goal or saved by the goalkeeper
Seven Metre Shots Successful	SEMSS	Seven-metre (Penalty) shots were awarded during the game and scored
Seven Metre Shots Unsuccessful	SEMSU	Seven metre (Penalty) shots awarded during the game that were either thrown out of the goal post or saved by the goalkeeper
Nine Metre Shots Successful	NMSS	Shots taken from between the seven metre and around the nine metre line that were scored
Nine Metre Shots Unsuccessful	NMSU	Shots taken from between the seven metre and around the nine metre that were either thrown out of the goal post or saved by the goalkeeper
Wing Attack Shots Successful	WASS	Shots taken from either the left or right wing when the team form up there and prepares before shooting and scoring
Wing Attack Shots Unsuccessful	WASU	Shots taken from either the left or right wing when the team form up there and prepares before shooting, and either thrown out of the goal post or saved by the goalkeeper
Fast Break Shots Successful	FBSS	Shots taken from any part of the court as a result of fast breaks and scored
Fast Break Shots Unsuccessful	FBSU	Shots taken from any part of the court as a result of fast breaks, which were either thrown out of the goal post or saved by the goalkeeper
Total Shots Saved by Goalkeepers	TSSG	All unsuccessful shots which were a result of goalkeeper saves
Total Shots Thrown out of Goal	TSTG	All unsuccessful shots which were a result of balls thrown out of the goalpost (either over the top or any of the sides of the goalpost)

Notes: Marks were made with tape 3 metres from the goal line on the six metre line at each corner of the court to differentiate wing attack shots from six metre shots. Shots taken between the two marks were ticked as six-metre shots, while shots made between the goal line and the tape on each side of the court were ticked as wing attack shots.

### ***Data Collection Instruments***

Observation checklists in the form of tally sheets were used for data collection. The various positional efficiency variables were written, and spaces were provided for ticking. The research assistants accurately recorded the specific positional efficiency for each team as they completed an attack.

### ***Reliability and Validity***

Inter-rater reliability was used to measure the internal consistency of the observation. An inter-rater reliability coefficient of 0.85 indicates good reliability, as the number of agreement scores for the three observers for each team was compared. The researchers can also conclude that the data collected were valid due to the use of appropriate data collection instruments and statistical tests used for analysis. In effect, the researchers had sufficient data and employed the right statistical tools for analysis. Since videotapes and observational checklists are the primary

methods for measuring behaviour or performance, it can be stated that these tools accurately measure the outcomes they were designed to measure.

### **Competiton Setting**

All the teams played on the same outdoor concrete court at the campus of Kwame Nkrumah University of Science and Technology. Morning games were played between 7:00 and 9:00 a.m., and evening games were played from 4:00 to 6:00 p.m. each day. The games were organised in such a way that each team played an equal number of games in the morning and in the evening. The competition was organised under the International Handball Federation rules and was officiated by the officials of the Handball Referees Association, Ghana. The games were played using the standard duration for handball matches, which is two halves of thirty minutes each, followed by a ten-minute rest period. Each team played only one game in a day.

### **Statistical Analysis**

Data analysis was done using SPSS Version 26. A screening was conducted to check for the possibility of missing data and outliers, as well as a normality test, before selecting the analysis tool. The descriptive statistics were analysed using means and standard deviations, and the positional efficiency of the teams was analysed using an independent-samples t-test. All analyses were done with a statistical significance of  $p < 0.05$ .

### **3. Results**

From Table 3, the results of the various zonal teams for the parametres are presented as follows; for SMSS, the means (M) and standard deviations (SD) are as follows: ASHBA [M = 5.50 and SD = 1.00], EGA [M= 2.25 and SD= 5.00], NORTH [M= 3.50 and SD = 1.00], VOLTA [M = 4.25 and SD = .957]. Considering SMSU, ASHBA had M = 5.75 and SD= .957, EGA had M = 11.00 and SD = .819, NORTH [M = 7.50 and SD = 2.08], VOLTA [M = 5.25 and SD = 5.71]. For SEMSS, ASHBA had M = 3.50 and SD = 1.00, EGA [M = 2.25 and SD = 1.71], NORTH [M = 2.00 and SD = .819], VOLTA [M = 3.00 and SD= 1.41]. With SEMSU, ASHBA had M = 2.25 and SD = .957, EGA had M = 11.00 and SD = .817, NORTH [M = 1.50 and SD = 1.29], VOLTA [M = 2.75 and SD = 1.50]. Also, regarding NMSS, ASHBA had M = 6.00 and SD = 1.16; EGA had M = 5.75 and SD = .957; NORTH had M = 3.75 and SD = .957; and VOLTA had M = 5.00 and SD = 1.41. For NMSU, ASHBA had M = 6.75 and SD = .957; EGA had M = 5.25 and SD = 2.21; NORTH had M = 10.75 and SD = 1.71; and VOLTA had M = 7.75 and SD = 1.26. For WASS, ASHBA had M = 5.50 and SD = 2.38; EGA had M = 7.75 and SD = .957; NORTH had M = 6.50 and SD = 1.29; while VOLTA had M = 5.75 and SD = 1.26.

The result for WASU also showed that ASHBA had M = 7.75 and SD = .957, EGA had M = 9.50 and SD = 1.92, NORTH had M = 11.25 and SD = .957, and VOLTA had M = 8.25 and SD = .957. With FBSS, ASHBA had M = 6.75 and SD = .500; EGA had M = 9.00 and SD = .871; NORTH had M = 7.75 and SD = .957; and VOLTA had M = 7.00 and SD = 1.63. For FBSU, ASHBA had M = 5.00 and SD = .817; EGA had M = 4.75 and SD = 1.71; NORTH had M = 11.50 and SD = 1.91; while VOLTA had M = 5.00 and SD = .817. TSSG, ASHBA had M = 9.25 and SD = .500; EGA had M = 10.25 and SD = .957; NORTH had M = 4.00 and SD = .817; VOLTA had M = 12.50 and SD = 2.38. Finally, TSTG, ASHBA had M = 10.50 and SD = 2.87; EGA had M = 12.25 and SD = 2.87; NORTH had M = 14.50 and SD = 2.08; and VOLTA had M = 8.25 and SD = .95.

**Table 3.** Descriptive statistics of the positional efficiency variables

<b>Zone</b>	<b>Variable</b>	<b>N</b>	<b>Min</b>	<b>Max</b>	<b>Mean</b>	<b>+/_ Score</b>
ASHBA	SMSS	4	4	6	5.50	1.00
	SMSU	4	5	7	5.75	.957
	SEMSS	4	2	4	3.50	1.00
	SEMSU	4	1	3	2.25	.957
	NMSS	4	5	7	6.00	1.16
	NMSU	4	6	8	6.75	.957
	WASS	4	4	9	5.50	2.38
	WASU	4	7	9	7.75	.957
	FBSS	4	6	7	6.75	.500
	FBSU	4	4	6	5.00	.817



Zone	Variable	N	Min	Max	Mean	+/_ Score
EGA	TSSG	4	9	10	9.25	.500
	TSTG	4	8	12	10.50	1.73
	SMSS	4	2	3	2.25	5.00
	SMSU	4	10	2	11.00	.817
	SEMSS	4	0	4	2.25	1.71
	SEMSU	4	2	4	3.00	.817
	NMSS	4	5	7	5.75	.957
	NMSU	4	3	8	5.25	2.21
	WASS	4	7	9	7.75	.957
	WASU	4	7	11	9.50	1.92
	FBSS	4	8	10	9.00	.871
	FBSU	4	3	7	4.75	1.71
	TSSG	4	9	11	10.25	.957
	TSTG	4	10	10	12.25	2.87
NORTH	SMSS	4	3	5	3.50	1.00
	SMSU	4	5	10	7.50	2.08
	SEMSS	4	1	3	2.00	.817
	SEMSU	4	0	3	1.50	1.29
	NMSS	4	3	5	3.75	.957
	NMSU	4	9	13	10.75	1.71
	WASS	4	5	8	6.50	1.29
	WASU	4	10	12	11.25	.957
	FBSS	4	7	9	7.75	.957
	FBSU	4	10	14	11.50	1.91
	TSSG	4	3	5	4.00	.817
	TSTG	4	13	17	14.50	2.08
VOLTA	SMSS	4	3	5	4.25	.957
	SMSU	4	3	7	5.25	1.71
	SEMSS	4	1	4	3.00	1.41
	SEMSU	4	1	4	2.75	1.50
	NMSS	4	3	6	5.00	1.41
	NMSU	4	6	9	7.75	1.26
	WASS	4	7	7	5.75	1.26
	WASU	4	7	9	8.25	.957
	FBSS	4	5	9	7.00	1.63
	FBSU	4	4	6	5.00	.817
	TSSG	4	10	15	12.50	2.38
	TSTG	4	7	9	8.25	.957

Based on Table 4, the independent-samples t-test was used to compare the results for the first pair of winning and losing teams: the first-placed zone, VOLTA, and the bottom-placed zone, NORTH. The results showed a statistically significant difference between the two zones for WASU,  $t(1) = 1.00$ ,  $p = .005$  [VOLTA,  $M = 8.25$ ; NORTH,  $M = 11.25$ ], FBSU,  $t(1) = -5.46$ ,  $p = .002$  [VOLTA,  $M = 5.00$ ; NORTH,  $M = 11.50$ ], and TSSG,  $t(1) = 7.14$ ,  $p = .003$  [VOLTA,  $M = 12.50$ ; NORTH,  $M = 4.00$ ]. Meanwhile, there was no statistically significant difference for all the other positional variables: SMSS,  $t(1) = 1.00$ ,  $p = .391$  [VOLTA,  $M = 4.25$ ; NORTH,  $M = 3.50$ ]; SMSU,  $t(1) = -1.45$ ,  $p = .242$  [VOLTA,  $M = 5.25$ ; NORTH,  $M = 7.50$ ]; NMSS,  $t(1) = 2.61$ ,  $p = .080$  [VOLTA,  $M = 5.00$ ; NORTH,  $M = 3.75$ ]; NMSU,  $t(1) = -2.04$ ,  $p = .134$  [VOLTA,  $M = 7.75$ ; NORTH,  $M = 10.75$ ]; WASS,  $t(1) = -1.57$ ,  $p = .251$  [VOLTA,  $M = 5.75$ ; NORTH,  $M = 6.50$ ]; FBSS,  $t(1) = -0.600$ ,  $p = .591$  [VOLTA,  $M = 7.00$ ; NORTH,  $M = 7.75$ ]; and finally, TSTG,  $t(1) = -4.25$ ,  $p = .018$  [VOLTA,  $M = 8.25$ ; NORTH,  $M = 14.50$ ].



**Table 4.** Independent sample *t*-test for VOLTA and NORTH

Zones	Variable	Mean	+/- Score	t	Sig.
VOLTA/NORTH	SMSS	.750	1.50	1.00	.391
	SMSU	-2.25	3.10	-1.45	.242
	SEMSS	1.00	1.63	1.22	.308
	SEMSU	1.25	1.71	1.46	.239
	NMSS	1.25	.957	2.61	.080
	NMSU	-3.00	.817	-2.04	.134
	WASS	-.750	.957	-1.57	.251
	WASU	-3.00	.817	-7.35	.005
	FBSS	-.750	2.50	-.600	.591
	FBSU	-6.50	2.38	-5.46	.002
	TSSG	8.50	2.38	7.14	.003
	TSTG	-6.25	2.63	-4.75	.018

Table 5 shows the test results for the second pair of winning and losing teams, which included the first-placed zone for the tournament, VOLTA, and the second-placed team from the bottom-placed zone, EGA. Results indicated a statistically significant difference between the two zones: SMSU,  $t(1) = -5.17$ ,  $p = .004$  [VOLTA had  $M = 5.25$ , EGA had  $M = 11.00$ ]. Similarly, TSTG,  $t(1) = -1.67$ ,  $p = .003$  [VOLTA had  $M = 8.25$ , EGA had  $M = 12.25$ ], and TSTG again,  $t(1) = 1.67$ ,  $p = .003$ . No statistically significant difference was found between the teams: SMSS,  $t(1) = 1.00$ ,  $p = .391$  [VOLTA had  $M = 4.25$ , EGA had  $M = 2.25$ ], SMSS,  $t(1) = 1.22$ ,  $p = .308$  [VOLTA had  $M = 3.00$ , EGA had  $M = 2.25$ ], NMSS,  $t(1) = -1.57$ ,  $p = .215$  [VOLTA had  $M = 5.00$ , EGA had  $M = 5.75$ ], NMSU,  $t(1) = 1.73$ ,  $p = .182$  [VOLTA had  $M = 7.75$ , EGA had  $M = 5.25$ ], WASS,  $t(1) = -1.85$ ,  $p = .161$  [VOLTA had  $M = 5.75$ , EGA had  $M = 7.75$ ], WASU,  $t(1) = -1.67$ ,  $p = .194$  [VOLTA had  $M = 8.25$ , EGA had  $M = 9.50$ ], FBSS,  $t(1) = -2.19$ ,  $p = .116$  [VOLTA had  $M = 7.00$ , EGA had  $M = 9.00$ ], FBSU,  $t(1) = 1.32$ ,  $p = .278$  [VOLTA had  $M = 5.00$ , EGA had  $M = 4.75$ ], and TSSG,  $t(1) = 1.06$ ,  $p = .367$  [VOLTA had  $M = 12.50$ , EGA had  $M = 10.25$ ].

**Table 5.** Independent Sample *t*-test for VOLTA and EGA

Zones	Variable	Mean	+/_ Score	T	Sig.
VOLTA/EGA	SMSS	2.00	.817	4.90	.016
	SMSU	-5.75	2.22	-5.17	.004
	SEMSS	.750	2.22	.676	.457
	SEMSU	-.250	2.06	-.234	.824
	NMSS	-.750	.957	-1.57	.215
	NMSU	2.50	2.89	1.73	.182
	WASS	-2.00	2.16	-1.85	.161
	WASU	-1.25	1.50	-1.67	.194
	FBSS	-2.00	1.83	-2.19	.116
	FBSU	1.25	1.90	1.32	.278
	TSSG	1.75	3.30	1.06	.367
	TSTG	-3.50	4.20	-1.67	.003

Table 6 also presents the test results for the third pair of winning and losing teams and compares the second-placed zone for the tournament, ASHBA, with the bottom-placed zone, NORTH. Results showed that there was a statistically significant difference between the two zones for NMSS,  $t(1) = 9.00$ ,  $p = .003$  [ASHBA had  $M = 6.00$ , NORTH had  $M = 3.75$ ] and NMSU,  $t(1) = -9.80$ ,  $p = .002$  [ASHBA had  $M = 6.75$ , NORTH had  $M = 10.75$ ], WASU,  $t(1) = -4.04$ ,  $p = .002$  [ASHBA had  $M = 7.75$ , NORTH had  $M = 11.25$ ], FBSU,  $t(1) = -10.98$ ,  $p = .002$  [ASHBA had  $M = 5.00$ , NORTH had  $M = 11.50$ ], TSSG,  $t(1) = 8.88$ ,  $p = .003$ , [ASHBA had  $M = 9.25$ , NORTH had  $M = 4.00$ ].

Conversely, no statistically significant difference was observed between the teams as follows: SMSS,  $t(1) = 3.46$ ,  $p = .041$  [ASHBA had  $M = 5.50$ , NORTH had  $M = 3.50$ ]; SMSU,  $t(1) = -5.77$ ,  $p = .604$  [ASHBA had  $M = 5.75$ , NORTH had  $M = 7.50$ ]; SEMSS,  $t(1) = 5.20$ ,  $p = .014$  [ASHBA had  $M = 3.50$ , NORTH had  $M = 2.00$ ]; SEMSU,  $t(1) = .676$ ,  $p = .547$  [ASHBA had  $M = 2.25$ , NORTH had  $M = 1.50$ ]; WASS,  $t(1) = -.679$ ,  $p = .546$  [ASHBA had  $M = 5.50$ , NORTH had  $M = 6.50$ ]; FBSS,  $t(1) = -2.45$ ,  $p = .092$  [ASHBA had  $M = 6.75$ , NORTH had  $M = 7.75$ ]; and finally, TSTG,  $t(1) = -2.75$ ,  $p = .069$  [ASHBA had  $M = 10.50$ , NORTH had  $M = 14.50$ ].

**Table 6.** Independent Sample t-test for ASHBA and NORTH

Zones	Variable	Mean	+/- Score	t	Sig.
ASHBA/NORTH	SMSS	2.00	1.16	3.46	.041
	SMSU	-5.00	1.73	-5.77	.604
	SEMSS	1.50	.577	5.20	.014
	SEMSU	.250	2.22	.676	.547
	NMSS	2.25	.500	9.00	.003
	NMSU	-4.00	.816	-9.80	.002
	WASS	-1.00	2.94	-.679	.546
	WASU	-3.50	1.73	-4.04	.002
	FBSS	-1.00	.817	-2.45	.092
	FBSU	-5.52	.957	-10.98	.002
	TSSG	4.24	.957	8.88	.003
	TSTG	-3.00	2.16	-2.78	.069

From Table 7, the test results for the fourth pair of winning and losing teams, the second-placed zone for the tournament, ASHBA, and the second-placed from the bottom, EGA, are presented. The table shows a statistically significant difference between the two zones only for SMSU,  $t(1) = -21.00$ ,  $p < .001$ , where ASHBA had a mean of 5.75, and EGA had a Mean of 11.00. Similarly, for SMSS,  $t(1) = 6.79$ ,  $p = .005$ , with means of 5.50 for ASHBA and 2.25 for EGA. No statistically significant differences were found between the teams in other comparisons: SEMSS,  $t(1) = 1.00$ ,  $p = .391$ , with means of 3.50 for ASHBA and 2.25 for EGA; SEMSU,  $t(1) = -0.878$ ,  $p = .444$ , with means of 2.25 and 3.00 respectively; NMSS,  $t(1) = 1.00$ ,  $p = .391$ , with means of 6.00 and 5.75; NMSU,  $t(1) = 1.72$ ,  $p = .182$ , with means of 6.75 and 5.25; WASS,  $t(1) = -1.45$ ,  $p = .242$ , with means of 5.50 and 7.75; WASU,  $t(1) = -1.33$ ,  $p = .275$ , with means of 7.75 and 9.50; FBSS,  $t(1) = -4.70$ ,  $p = .018$ , with means of 6.75 and 9.00; FBSU,  $t(1) = .212$ ,  $p = .846$ , with means of 5.00 and 4.75. For TSSG, the results were  $t(1) = -1.41$ ,  $p$  not specified, with means of 9.25 for ASHBA and 10.25 for EGA. Lastly, the Total TSTG showed  $t(1) = -1.22$ ,  $p = .310$ , with means of 10.50 for ASHBA and 12.25 for EGA.

**Table 7.** Independent Sample t-test for ASHBA and EGA

Zones	Variable	Mean	+/- Score	t	Sig.
ASHBA/EGA	SMSS	3.25	.957	6.79	.005
	SMSU	-5.25	.500	-21.00	<.001
	SEMSS	1.25	2.50	1.00	.391
	SEMSU	.750	1.71	-.878	.444
	NMSS	.250	.500	1.00	.391
	NMSU	1.50	1.73	1.72	.182
	WASS	-2.25	3.10	-1.45	.242
	WASU	-1.75	2.63	-1.33	.275
	FBSS	-2.25	.957	-4.70	.018
	FBSU	.250	2.36	.212	.846
	TSSG	-1.00	1.41	-1.41	.252
	TSTG	-1.75	2.87	-1.22	.310

#### 4. Discussion

The study examined the positional efficiency of winning and losing men's handball teams that participated in the Colleges of Education Sports Association Games held in September 2022. The objective was to identify indicators of positional efficiency for both winning and losing teams, as well as the contribution of these individual indicators to the teams' victories or defeats during the competition. Analysis revealed that, for the first pair of winning and losing teams, three out of the twelve positional indicator variables contributed to the difference between them: Wing Attack Shots Unsuccessful, Fast Break Shots Unsuccessful, and Total Shots Saved by Goalkeepers. This finding contradicts the results of Milanović et al. (2018) and Sporiš et al. (2015), who analysed 80 matches of the World Handball Championship (Egypt 1999) and found a significant relationship between match outcome and all positional efficiency variables.

Meanwhile, the current study concurs with that of Vuleta and Spurious (2015), who found that only variables associated with positional efficiency, specifically the frequency of shots at certain positions, had a significant impact on match results. These variables included the position of external attackers, ranging from individual actions to passing and counterattacks. Rogul (2000) analysed differences between successful and unsuccessful teams in 80 matches from the same competition, using 27 positional-efficiency parameters in the defence and attack stages. A statistically significant difference was found in only two discriminatory factors (Number of Goals Scored, Efficiency of the implementation of attack, Efficiency of players in the defence, and Positional Performance of Goalkeeper Defence). He stated that the variable that most affected the negative outcome of the matches was the number of unsuccessful shots.

Knowledge of the handball player, positional or situational and action efficiency parameters of the handball player, which are determined by all situations that occur in the game or a whole competition, and finally, the handball player's competitive impact have also been identified as a contributory factor to best results during competitions (Foreti et al., 2013). Data for parameters related to positional efficiency can be collected using various methods during the competition. It can also be done subsequently after the game if a videotape of the match is taken. When two teams meet in a contest, the game may produce similar but not identical development or outcomes (Vuleta et al., 2015). By analysing the indicators arising from a particular handball game, we can assess the positional or situational effectiveness of the game and its players.

This finding will enable coaches to identify elements that produce good results and are likely to contribute to improved performance in future games. Conversely, it allows coaches to identify factors that hinder performance by analysing such indicators (Callinan et al., 2023). Researchers therefore examine various positional efficiencies, for instance, during attack, defence, and the entire transition of play in a particular handball match. Based on recorded indicators, coaches can effectively assess the contributions of each player's successful and unsuccessful actions during attack or defence (Fasold, Redlich, 2018). Þorgeirsson (2024) analysed the differences between successful and unsuccessful teams in 80 matches of the same competition by using 27 parameters of positional efficiency in defence and attack stages. A statistically significant difference was found in two discriminatory factors (Number of Goals Scored, Efficiency of attack implementation, Efficiency of players in defence, and Positional Performance of Goalkeeper Defence). A variable that particularly influenced the negative outcome in most matches was the number of unsuccessful shots from the external position. Rogulj et al. (2004) examined the contribution of individual parameters of situational and positional efficiency to the outcome of handball matches at the 1999 World Handball Championship for men in Egypt. Ten official situational efficiency parameters in defence showed a statistically significant difference in distinguishing successful from unsuccessful teams.

In this sense, the authors specifically highlighted the efficiency of goalkeepers' shot defences from an external position. Rogulj et al. (2004) analysed the efficiency parameters of 19 elements of the collective skill games in the attack phase for both successful and unsuccessful men's teams competing in the Croatian championship during the 1998/99 season. The duration, continuity, systematic organisation, and spatial orientation of different attacks were found to have contributed to the success of collective tactics in both successful and unsuccessful teams (Ferrari et al., 2020).

Modern, organised parameters of competitive activities in sports serve as the basis for comparative analysis of athletes and teams, and this is very important because they provide a comprehensive understanding that informs coaches on how to prepare for the off-season, pre-

season, and in-season. It also enables coaches to identify the best positions for their players to achieve effective performance and how to rotate players for specific games, especially in competitions that span a long period (Fernandez-Echeverria et al., 2017). Consequently, it will create a clear picture for the coach of the part of the court where his or her team is most effective, thereby utilising it to achieve success in competitions. Applying positional analysis to the processes of modern handball training regimes, competitions, and other team sports is crucial and indispensable in achieving better results for players and teams (Holenco, 2020; Masanovic et al., 2018; Shalar et al., 2018).

## 5. Conclusion

In a team handball game, the outcome of a match depends on several factors, including players' characteristics and the nature of the competition. The characteristics of players on a specific team determine how efficient they are at certain parts of the court, thereby enhancing efficiency in one position or another. During the competition that is being discussed, researchers observed that the key positional efficiency that made a difference in most matches was goalkeeping. The goalkeeper's success in saving shots determines most match results, with teams having the most goalkeeper saves winning their games (Hatzimanouil et al., 2022; Hatzimanouil et al., 2017). The next positional efficiency that determined game results was the success rate of fast-break shots. Teams that were observed not to be utilising this particular variable successfully lost most of their games. Coaches who handle handball teams for the various zones and handball coaches in general must therefore plan well to maximise the particular position(s) where they are more efficient to have the best out of their teams in subsequent tournaments to win most games to annex the ultimate trophy.

## 6. Declarations

### ***Ethics approval and consent to participate***

The study was conducted in accordance with the Declaration of Helsinki and was approved by the National Colleges of Education Association, the organising body of the competition. Additionally, coaches of the various teams and their players were informed of the research's nature before data collection during the matches.

### ***Consent for publication***

All authors read through and approved the final copy of this manuscript and agree to be accountable for every aspect of the work. We are therefore confident that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved before it is submitted for publication.

### ***Availability of data and materials***

Data and materials for the study can be obtained from the corresponding author.

### ***Conflict of interest***

The authors declare that they have no conflict of interest.

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### ***Authors' Contributions***

AKE: conceptualisation, methodology, data analysis, original draft, review and editing.

KO: data curation, review and editing, supervision, funding.


CI: methodology, data curation, writing, review and editing.

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## Gender and Age Differences in Behaviours Related to Mathematics Anxiety Across Six Asian Countries

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## Abstract

Mathematics anxiety has become a growing concern, impacting not only academic performance but also daily life. This study investigates mathematical anxiety across genders and age groups in Asia using the five-dimensional Anxiety Towards Mathematics Scale. A total of 2,831 responses were collected from six countries: Pakistan (38.3 %), Iran (10.8 %), Thailand (5.5 %), India (16.1 %), Malaysia (18.1 %), and the United Arab Emirates (11.2 %). Most participants (61.8 %) were between 16 and 20 years old, with females representing 58.7 % of the sample and males 41.2%. A confirmatory factor analysis (CFA) validated the five-factor structure of mathematical anxiety, encompassing anxiety towards evaluation, temporality, understanding mathematical problems, numbers and operations, and real-life mathematical situations. The model demonstrated excellent fit ( $\chi^2$  (242,  $N = 2,829$ ) = 1,887.08,  $p < .001$ ; CFI = 0.99; TLI = 0.99; RMSEA = 0.049; SRMR = 0.11). Significant gender differences were observed, with females experiencing higher anxiety in daily mathematical situations, while males showed greater anxiety towards numbers and operations. Age differences were also notable, particularly in anxiety related to temporality, where participants aged 16-20 exhibited lower anxiety compared to those aged 21-23. These findings emphasise the diverse impacts of mathematical anxiety across demographic groups, suggesting that tailored strategies are crucial to addressing the specific needs of different populations. We recommend that educational institutions and policymakers develop targeted interventions to address gender- and age-specific challenges.

**Keywords:** Asia, Age Variation, Gender Differences, Mathematics Anxiety, Mathematics.

## 1. Introduction

Learning and achievements in mathematics are affected by several factors. Occasionally, people with specific mathematical learning disabilities face cognitive barriers (Dowker et al., 2016). Still, for many others, the primary obstacle is mathematics anxiety, a debilitating emotional response characterised by fear, tension, and avoidance of numerical tasks (Ramirez et al., 2018; Sokolowski et al., 2019). Globally, mathematics anxiety has been identified as a critical barrier to mathematical achievement worldwide. Research indicates that approximately 14 % of the variance in mathematical performance can be attributed to Mathematics Anxiety, with highly anxious individuals underperforming relative to their actual abilities (Van Mier et al., 2019; Vos et al., 2023). Beyond academic settings, mathematics anxiety influences career choices, working memory efficiency, and even everyday activities like financial decision-making (Ashcraft, Krause, 2007; Maloney, Beilock, 2012). Despite its pervasive impact, mathematics anxiety manifests differently across gender and age groups, with studies consistently reporting higher anxiety levels among females (Else-Quest et al., 2010; Xie et al., 2024) and peak intensity during adolescence (Ashcraft, Moore, 2009; Hill et al., 2016). However, much of this evidence derives from Western contexts, leaving a gap in understanding how cultural and educational systems in Asia shape mathematics anxiety-related behaviours.

Mathematics Anxiety is not merely a dislike of mathematics but a physiological and cognitive stress response that impairs performance (Ukwujie, Eteng-Uket, 2024; Ali et al., 2019). Neuroimaging studies reveal that Mathematics Anxiety triggers hyperactivity in brain regions associated with fear (e.g., the amygdala) while suppressing areas responsible for numerical reasoning (Ashcraft et al., 2007; Young et al., 2012). This disruption exacerbates avoidance behaviours, creating a vicious cycle: anxious students disengage from mathematics, reducing competency and perpetuating anxiety (Abraham et al., 2017; Mutodi, Ngirande, 2014; Wang et al., 2020). Cross-sectional data suggest that mathematics anxiety emerges as early as age 6–7 (Aarnos, Perkkilä, 2012) and escalates with curricular complexity, peaking in secondary school (Si et al., 2016; Van Mier et al., 2019). Notably, mathematics anxiety's effects are not uniform; gender differences in anxiety levels, though absent in early childhood, become pronounced by adolescence, with girls reporting 0.3 standard deviations higher Mathematics Anxiety than boys (Ashcraft, Moore, 2009; Bakker et al., 2019).

Globally, females exhibit higher mathematics anxiety than males, a gap magnified by societal stereotypes framing mathematics as a “male domain” (Dowker et al., 2016; Vos et al., 2023). For instance, girls as young as second grade show stronger negative correlations between mathematics anxiety and performance (Van Mier et al., 2019), while boys often face heightened anxiety in numerical tasks (Baloglu, Koçak, 2006). Age further moderates these trends; gender

differences in mathematics anxiety are negligible in elementary school but widen significantly in middle school (Xie et al., 2024). Cultural factors may explain discrepancies. In Confucian-influenced systems, parental pressure on males to excel in Science, Technology, Engineering, and Mathematics (STEM) fields may increase their anxiety (Ashcraft, Krause, 2007). In contrast, in other Asian contexts, gendered pedagogical practices may disproportionately affect females (Sarfo et al., 2020).

Despite the global relevance of mathematics anxiety, Asian populations remain underrepresented in the literature (Morsanyi et al., 2016). Existing studies often rely on single-country samples, which can obscure regional variations in educational practices (e.g., rote learning vs. conceptual emphasis) and societal attitudes (Wang et al., 2020; Castelveccchi, 2020). For example, while Chinese students outperform Western peers in computational tasks (Imbo, LeFevre, 2009), their mathematics anxiety profiles remain understudied (Xie et al., 2024). Similarly, the interplay between mathematics anxiety-related behaviours (e.g., procrastination, help-seeking) and cultural norms – such as collectivist values that discourage academic help-seeking – is poorly understood (Ali et al., 2019). This study addresses these gaps by examining gender and age differences in mathematics anxiety-related behaviours across six Asian countries. By comparing avoidance patterns, coping strategies, and performance outcomes, we aim to disentangle universal mechanisms of Mathematics Anxiety from culturally specific manifestations. Our findings will inform the development of tailored interventions to mitigate the impact of mathematics anxiety in diverse educational settings.

## 2. Method

### *Participants*

A total of 2,831 responses were collected from Asian countries, with 38.3 % from Pakistan, 10.8 % from Iran, 5.5 % from Thailand, 16.1 % from India, 18.1 % from Malaysia, and 11.2 % from the United Arab Emirates. Regarding the age of the participants, 0.01% reported being between 12 and 15 years old, 61.8 % between 16 and 20 years old, 37.9 % between 21 and 23 years old, and 0.2 % between 24 and 20 years old. The distribution was 58.7 % Female and 41.2% Male. See Table 1 for details.

**Table 1.** Sample descriptions of data from the mathematics anxiety survey (n = 2,831)

Country	Region collected	Gender (n)		Mean age (SD)
		Male	Female	
India	Puducherry	47	203	20.39 (1.70)
	Uttar Pradesh	76	131	19.41 (2.47)
Iran	Qom	75	80	19.09 (2.27)
	Tehran	79	71	19.04 (2.31)
Malaysia	Online	279	231	19.97 (2.15)
Pakistan	Faisalabad	40	116	20.60 (1.42)
	Lahore	148	183	20.00 (1.88)
	Rawalpindi	83	121	20.03 (1.40)
	Sargodha	168	226	19.77 (1.54)
Thailand	Bangkok	82	73	20.63 (1.77)
United Arab Emirates	Online	89	228	19.94 (1.70)

### *Instruments*

An online questionnaire was published, containing sociodemographic questions such as age, gender, and location of residence. Furthermore, the questionnaire contained the following measures:

*Anxiety Towards Mathematics Scale* (Muñoz, Mato-Vazquez, 2007): This instrument consists of 24 items regarding people's anxiety towards Mathematics. The items portrayed aspects such as anxiety towards evaluation (11 items), anxiety towards temporality (4 items), anxiety towards understanding mathematical problems (3 items), anxiety towards numbers and mathematical operations (3 items), and anxiety towards mathematical situations in daily life (3 items). Each item was rated on a five-point scale, ranging from "Strongly Disagree" to "Strongly Agree".

Agree.” Several studies, including García-Santillán et al. (2018) and Sarfo et al. (2020), have reported a high reliability for this scale, with a Cronbach’s alpha of 0.97. Consistently, our findings also showed strong internal consistency, with Cronbach’s alpha values exceeding 0.90 across all sites.

### Data Collection Procedure

We obtained the ethical approval for the project from the Institutional Review Board of the International Network Center for Applied Research (INCFAR-IRB/009/01-2020). Collaborators who required additional local or institutional ethical clearance were permitted to obtain it independently. Furthermore, they were allowed to translate the study protocol and instruments into their respective national or native languages when necessary. Also, participating sites were expected to recruit at least 150 community-based participants from their local populations. In three other countries – Malaysia, Egypt, and the United Arab Emirates – this requirement was relaxed due to the use of online data collection methods.

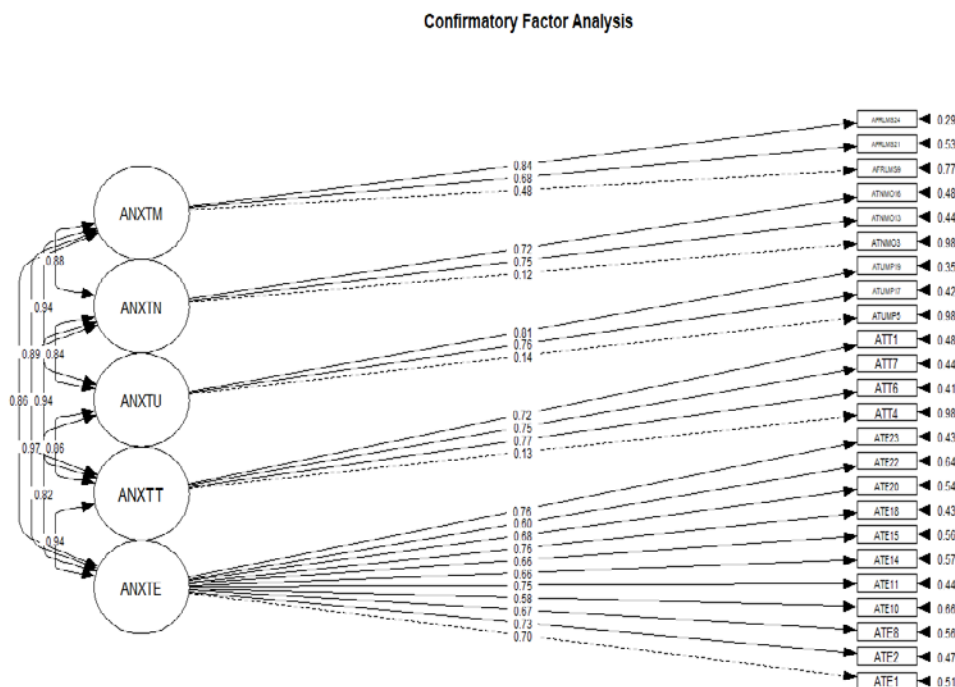
### Data analysis

First, we conducted a confirmatory factor analysis for the five-factor model proposed by Muños and Mato-Vázquez (2007) using R software (R Core Team, 2019) and the lavaan package (Rosseel, 2012) with the WLSMV estimator. The goodness of fit of the model was assessed using the following combination of fit statistics: chi-squared ( $\chi^2$ ), Tucker-Lewis Index (TLI), comparative fit index (CFI), root mean square error of approximation (RMSEA), and the standardised root mean square residual (SRMR). In line with Brown’s (2015) recommendations, the cut-off values for CFI and TLI are close to 0.90, 0.08 for RMSEA, and 0.08 for SRMR, indicating a good fit for any given model.

Then, means and standard deviations were calculated to perform an independent t-test comparing males and females regarding mathematical anxiety. Furthermore, we conducted a one-way between-subjects ANOVA to test differences between age categories.

## 3. Results

The goodness-of-fit statistics for the confirmatory factor analysis were as follows:  $\chi^2(242, N = 2,829) = 1,887.08$ ,  $p < .001$ ; CFI = 0.99; TLI = 0.99; RMSEA = 0.049 (90 % CI [0.047, 0.051]); SRMR = 0.11. A path diagram of the confirmatory factor analysis can be seen in Figure 1.



**Fig. 1.** Path diagram of the Confirmatory Factor Analysis of the Mathematical Anxiety Scale  
 Notes: ATE = anxiety towards evaluation; ATT = Anxiety towards temporality; ATUMP = Anxiety towards the understanding of mathematical problems; ATNMO = Anxiety towards numbers and mathematical operations; AFRLMS = Anxiety towards mathematical situations in daily life.

An independent-sample t-test was conducted to compare mathematics anxiety factors in males and females. There was a significant difference in the scores of males in anxiety towards numbers and mathematical operations, and anxiety towards mathematical situations in daily life, compared to females (Table 2). Females had higher scores in anxiety towards mathematical situations in daily life, and males had higher scores in anxiety towards numbers and mathematical operations.

**Table 2.** Independent t-test between males and females for mathematical anxiety factors

Categories of Mathematics Anxiety	Sex	N	Mean	SD	t-test
Anxiety towards evaluation	Males	1,167	3.15	0.90	$t(2,579.11) = 0.31$ , $p = 0.76$
	Females	1,662	3.14	0.94	
Anxiety towards temporality	Males	1,143	3.15	1.08	$t(2,786) = 0.70$ , $p = 0.48$
	Females	1,645	3.12	1.06	
Anxiety towards the understanding of mathematical problems	Males	1,143	2.88	1.06	$t(2,786) = 1.19$ , $p = 0.23$
	Females	1,645	2.83	1.08	
Anxiety towards numbers and mathematical operations	Males	1,143	3.02	1.01	$t(2,786) = -2.54$ , $p = .01$ , $d = 0.10$ , Hedge's $g = 0.10$
	Females	1,645	3.12	1.03	
Anxiety towards mathematical situations in daily life	Males	1,167	2.85	0.99	$t(2,827) = 2.35$ , $p = .02$ , $d = 0.09$ , Hedge's $g = 0.09$
	Females	1,662	2.76	1.00	

A one-way between-subjects ANOVA was conducted to compare mathematical anxiety factors in age categories. There was a significant difference of anxiety towards temporality for the three conditions [ $F(2, 2,786) = 3.13$ ,  $p < 0.05$ ], but no significant differences in: anxiety towards evaluation [ $F(2, 2,827) = 0.15$ ,  $p = 0.86$ ]; anxiety towards the understanding of mathematical problems [ $F(2, 2,786) = 1.36$ ,  $p = 0.26$ ]; anxiety towards numbers and mathematical operations [ $F(2, 2,786) = 0.50$ ,  $p = 0.61$ ] and anxiety towards mathematical situations in daily life [ $F(2, 2,827) = 0.81$ ,  $p = 0.45$ ]. Post hoc analyses (Table 3) using the Bonferroni post hoc criterion for significance indicated that people with 16-20 years ( $M = 3.10$  and  $SD = 1.08$ ) presented lower levels of anxiety towards temporality than those with 21-23 years ( $M = 3.20$  and  $SD = 1.05$ ,  $p < 0.05$ ).

**Table 3.** Post-Hoc analysis of differences between age categories using Bonferroni correction for mathematical anxiety towards temporality

Age Categories		16-20	21-23	24-30
16-20	Mean difference	-	-0.10*	0.21
	p-value	-	< .05	1
21-23	Mean difference		-	0.31
	p-value		-	1
24-30	Mean difference			-
	p-value			-



#### 4. Discussion

This study examined gender and age differences in mathematics anxiety across six Asian countries (India, Iran, Malaysia, Pakistan, Thailand and the United Arab Emirates), contributing to the growing body of cross-cultural research on mathematics anxiety. Our findings reveal patterns in the expression of mathematics anxiety, reinforcing some established trends while challenging others. Consistent with global meta-analyses (Else-Quest et al., 2010; Xie et al., 2024), our results indicate that females reported significantly higher levels of anxiety towards mathematical situations in daily life than males. This result aligns with studies suggesting that societal stereotypes framing mathematics as a “male domain” exacerbate anxiety in girls (Dowker et al., 2016; Vos et al., 2023). However, we observed an unexpected reversal in anxiety towards numbers and mathematical operations, where males scored higher. This finding contrasts with Western findings but mirrors regional studies in Iran and India, where boys face heightened pressure to excel in STEM, potentially increasing task-specific anxiety (Ashcraft, Krause, 2007; Abraham et al., 2017).

Notably, gender differences were absent in anxiety towards evaluation, temporality, and problem understanding, diverging from prior work (Rodríguez et al., 2020). These results suggest that specific dimensions of mathematics anxiety may be more culturally invariant, while others (e.g., numerical operations) are sensitive to contextual factors, such as pedagogical practices or parental expectations (Baloglu, Koçak, 2006). For instance, in Iran, where female participants exhibited lower anxiety towards numbers and mathematical operations than males, the legacy of mathematician Maryam Mirzakhani’s success may have mitigated girls’ anxiety (Castelvecchi, 2020). Our ANOVA results revealed that anxiety towards temporality varied significantly by age, with the 16–20 age group reporting lower levels than the 21–23 cohort. These findings support developmental theories positing that mathematics anxiety escalates with curricular complexity (Si et al., 2016; Van Mier et al., 2019). However, the lack of age differences in other mathematics anxiety dimensions (e.g., evaluation, daily-life anxiety) contrasts with studies highlighting adolescence as a peak period for mathematics anxiety (Ashcraft, Moore, 2009). One explanation is that older students in our sample (mostly undergraduates) may have developed coping strategies, whereas younger participants (ages 12–15) were underrepresented. Future research should prioritise broader age sampling to clarify these trends.

The absence of gender gaps in evaluation anxiety across all countries challenges the universality of “stereotype threat” effects (Sokolowski et al., 2019). For example, in Malaysia and the United Arab Emirates, where math instruction often emphasises collaborative learning, evaluation anxiety may be mitigated for both genders (Ali, Hassan, 2019). Conversely, in Pakistan and India, where rote memorisation is prevalent (Mutodi, Ngirande, 2014), males’ higher anxiety towards numbers and mathematical operations scores may reflect frustration with abstract problem-solving. While our CFA confirmed the robustness of the mathematics anxiety scale, the SRMR value (0.11) suggests room for refinement in measuring cross-cultural equivalence. Additionally, the uneven sample distribution (e.g., 38.3 % from Pakistan) limits the generalisability of the findings. Future studies should employ stratified sampling and qualitative methods to explore how teacher-student interactions or parental attitudes mediate mathematics anxiety (Dowker et al., 2016). This study highlights that mathematics anxiety is not a monolithic construct, but rather a mosaic of culturally and developmentally shaped anxieties. By identifying context-specific patterns across Asia, we move closer to developing equitable, evidence-based strategies for reducing the global burden of mathematics anxiety.

#### 5. Conclusion

This study highlights significant variations in mathematics anxiety across gender and age groups. Females reported higher anxiety in everyday mathematical contexts, while males showed greater anxiety towards numbers and operations. Age differences also emerged, with younger participants experiencing lower anxiety related to temporality compared to older peers. These findings have important practical implications. Educators should consider gender- and age-specific patterns of mathematics anxiety when designing classroom strategies and support systems. Tailored interventions, such as differentiated instruction, peer mentoring, or targeted anxiety-reduction programs, could enhance students’ confidence and performance in mathematics.

From a policy perspective, these insights call for integrating emotional and psychological well-being into national mathematics curricula. Policies that promote teacher training in emotional

intelligence and mental health literacy could foster more inclusive and responsive learning environments for mathematics. Additionally, future research should investigate the underlying causes of gendered and age-related experiences of mathematics anxiety across diverse cultural contexts in Asia. Longitudinal and qualitative studies could provide deeper insights into how mathematics anxiety develops and changes over time, guiding more effective, evidence-based educational practices and interventions.

## 6. Strengths and Limitations

This study offers valuable contributions to the literature on mathematics anxiety by examining gender and age-related differences across six Asian countries. Notably, it is among the few recent cross-national investigations to explore mathematics anxiety within this region. The findings reveal significant gender differences – females reported higher anxiety in daily mathematical situations, whereas males showed greater anxiety related to numbers and operations. Age-related patterns were also observed, particularly regarding anxiety about temporality. These insights enhance our understanding of the complex ways in which mathematics anxiety manifests across demographic groups and cultural contexts.

Despite these strengths, the study has some limitations. The use of small, exploratory community samples limits the generalisability of the findings to the broader national populations. Additionally, online data collection in countries such as Malaysia and the United Arab Emirates may have introduced selection bias by excluding individuals without reliable internet access, potentially underrepresenting specific student demographics. Therefore, while the results provide a meaningful cross-cultural perspective, they should be interpreted with caution.

## 7. Declaration

### ***Ethics approval and consent to participate***

The study was conducted in accordance with the Declaration of Helsinki and was approved by the Institutional Review Board of the International Network Center for Applied Research (INCFAR-IRB/009/01-2020).

### ***Consent for publication***

All authors have reviewed and approved the final version of the manuscript for publication.

### ***Informed consent statement***

Informed consent was obtained from all subjects involved in the study. For participants under 18 years of age, informed consent was obtained from their legal guardians/parents.

### ***Conflicts of interest***

The authors declare no conflicts of interest.

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### ***Authors' contributions***

All authors (JOS, AG-S, HR, VSM, MD, OS, PSD, SZ, FZ, RZ, SM, FA, NIM, HW, FOE, AT, JCS, JUA, MSH, MH, ZV, RVSB, TAA, and DKA) contributed to the conceptualisation, methodology, data collection, writing – original draft preparation, and review management and editing. The quantitative analysis was overseen by JOS, AG-S and RVSB, and the manuscript preparation was supervised by JOS. All authors have read and agreed to the published version of the manuscript.

### ***Data availability statement***


The data presented in this study are available on reasonable request from the corresponding author.

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## Breastfeeding Challenges among Career Mothers in A Low-Resource Setting: An Exploratory Study

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### Abstract

Exclusive breastfeeding is essential for infant health; however, career mothers face challenges in balancing work and family responsibilities, leading to lower exclusive breastfeeding rates. Understanding these dynamics is crucial for developing targeted interventions and policies. This study aimed to explore the work-related challenges faced by breastfeeding mothers. This study used a qualitative, exploratory, and descriptive design. A reflexive thematic analysis was used to investigate the challenges career mothers face in exclusive breastfeeding. The majority of working mothers desired to practice exclusive breastfeeding for six months. Still, many deviated due to work demands, time constraints, lack of lactation rooms, limited maternity leave, and stress. The study concluded that working mothers desire to practice exclusive breastfeeding for six months due to its benefits, but workplace challenges, such as a lack of lactation rooms, inadequate maternity leave, and time constraints, may hinder them. Governments should ensure that maternity leave aligns with Exclusive Breastfeeding Feeding practices.

**Keywords:** Breastfeeding Mothers, Career Mothers, Exclusive Breastfeeding, Low-Resource Settings, Workplace Challenges.

### 1. Introduction

According to the World Health Organization (WHO), exclusive breastfeeding is defined as the practice of feeding infants only breast milk, with no additional food or drink, for the first six months of life. Breast milk provides all the nutrients needed for survival, growth, and development (Soumah et al., 2021), as well as immunological, antibacterial, and anti-inflammatory properties in infants (Tsegaw et al., 2021). It has also been shown to confer numerous health benefits for both mother and infant, including reduced risks of infections, malnutrition, and chronic diseases (Victora et al., 2016).

Breastfeeding, according to Alshammari and Haridi (2021), is not just a lifestyle choice of the mother but a lifetime investment in health. It has been noted that breastfeeding is a crucial long-term investment in a child's physical, cognitive, and social development, as well as a vital first step in protecting against poverty, disease, and death (Hansen, 2016). Despite the recognised health and economic benefits of breastfeeding, the global exclusive breastfeeding prevalence remains low, at less

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than 40 % (WHO, 2014), but has increased to approximately 41 % worldwide. However, 37 % of African infants are exclusively breastfed (Bhattacharjee et al., 2017; Hemingway et al., 2021).

To fully recover from giving birth and initiate breastfeeding successfully, mothers require time off from work; however, early breastfeeding initiation and exclusive breastfeeding during the first six months are hampered by an early return to work (WHO, 2019). Working mothers in Kenya often discuss ending their exclusive breastfeeding early to prepare for their return to work (Ickes et al., 2021). The study found that 51 % of mothers reported that their work prevented them from practising exclusive breastfeeding (Bhandari et al., 2019).

In Ghana, study findings indicated that 16 % and 84 % of career mothers in the formal and informal sectors of employment, respectively, practised exclusive breastfeeding (Nkrumah, 2017). Therefore, the WHO and UNICEF have urged governments and companies to adopt family-friendly policies, including paid maternity leave lasting at least 18 weeks and ideally six months (WHO, 2019).

Among working women, only one-third 31 % were able to breastfeed their babies exclusively for six months (Kadale et al., 2018). Similarly, Smith and Becker (2016) indicated that the work environment significantly impacts breastfeeding practices among employed mothers, and that mothers face obstacles in their attempts to combine breastfeeding and working, including rigid work schedules and unequal access to physical space. A study's findings reported that a substantial number of employed women encounter impediments and obstacles in sustaining a breastfeeding relationship with their infants after resuming work, which may consequently lead them to terminate breastfeeding before the recommended duration (Dinour, Szaro, 2017).

In the Bunkpurugu district, there is limited research on the exclusive breastfeeding experience and practice among working mothers. Additionally, although numerous studies have been conducted on breastfeeding practices and difficulties, relatively little attention has been given to how breastfeeding and professional demands intersect in this context.

Understanding the experiences and practices of exclusive breastfeeding among breastfeeding career mothers can shed light on the potential challenges and barriers they face in adhering to these recommendations, thereby informing targeted interventions to promote better health outcomes for both mothers and infants. The strategies these mothers employ to balance their breastfeeding responsibilities with their professional obligations can offer valuable insights into supportive workplace policies, such as maternal leave arrangements and childcare facilities, that facilitate continued breastfeeding. Therefore, this study explored breastfeeding challenges among career mothers in the Bunkpurugu District of Ghana.

## **2. Methodology**

### ***Ethical consideration***

The Noguchi Memorial Institute for Medical Research Review Board provided ethical approval for the study under the number: NMIMR-IRB CPN: 130/23-24. To obtain participants' consent, they were informed of their ability to withdraw from the study at any time. Also, the participants were informed about the benefits, potential risks, and rewards associated with their participation to obtain their consent. The participants provided written and verbal informed consent prior to data collection. During data collection, each participant was assigned a pseudonym to maintain their confidentiality and anonymity.

### ***Study design***

This study employed a qualitative descriptive design to identify the challenges faced by employed breastfeeding mothers in their workplace in the Bunkpurugu District of Ghana. According to Creswell (2014), exploratory studies are useful for deciphering complex phenomena and formulating suggestions for future studies. Descriptive studies provide a comprehensive overview of the situation, enabling comparison with recommendations and identifying any gaps in practice (Sandelowski, 2010). The study design was favourable because it enabled the identification of gaps and provided an in-depth overview of the situation under study.

### ***Population and sampling***

The target population consisted of breastfeeding mothers with babies aged 0 to 12 months who were formally employed. However, the study excluded career mothers who were unable to participate in the interview due to ill health, as well as mothers who were newly employed. The participants were recruited using a purposive sampling technique. Purposive sampling is a non-probability sampling strategy commonly used in qualitative research to select study

participants based on the researcher's knowledge and understanding of the research topic (Polit, Beck, 2014). Fifteen (15) breastfeeding mothers were recruited for the study. This sample size was determined by saturation, where the researcher identified no new information or themes (Sarfo et al., 2021).

Participants were recruited from Child Welfare Clinics and through maternity ward registers in the Bunkprugu District, with assistance from facility managers, during the period from August to September 2024. Participants were provided with information pamphlets and consent forms after they were informed of the study.

#### ***Data collection procedure***

A semi-structured interview guide was developed to elicit responses from participants that aligned with the study's objectives. Based on the inclusion criteria, this guide was pretested with two breastfeeding mothers in Nalerigu, East Mamprusi Municipality. Data collection was carried out by the principal investigator, who has experience in qualitative research. Prior to the start of the study, she had no previous contact with the mothers. Face-to-face interviews were conducted using the data collection tool at the participants' convenience in a private office at their preferred time. The interviews lasted 30-45 minutes, with a duration of 3 months from August to September 2024. Audio recordings were obtained from participants with their consent and were later transcribed verbatim. Field notes were prepared to supplement the data, and participants were assured of privacy, confidentiality, and anonymity prior to the commencement of data collection.

#### ***Data analysis***

Data collection occurred concurrently with analysis. We analysed the interview data using Braun and Clarke's (2021) framework for reflexive thematic analysis. Audio recordings of the interviews were transcribed verbatim and compared to the interview transcripts by the principal author. The transcripts were originally and repeatedly examined by all the authors to identify similarities in the familiarisation process. Similar topics were grouped and coded using key concepts linked to the study objectives. Additionally, the compressed codes were then organised into sub-themes. To achieve accurate data representation, all researchers analysed the data and collaborated to create sub-themes. Once a consensus was established, researchers created a full-theme analysis report.

#### ***Methodological rigour (trustworthiness)***

Trustworthiness was founded on credibility, dependability, confirmability, and transferability, according to Guba and Lincoln (1994), to guarantee legitimacy. Participants were asked to review the transcript and confirm the themes produced from the analysis based on credibility. Dependability was ensured by using the same interview guide with a consistent line of questioning for all participants, thereby maintaining consistency. During the concurrent data gathering and analysis process, the research team held peer debriefing sessions to address data difficulties, common concepts, and emerging themes, thereby increasing the credibility of the study. Confirmability was achieved by conducting an audit trail of all activities involved in participant selection, data collection, and analysis. Transferability was addressed by providing a detailed account of all experiences during data collection, including information regarding the location and context of the interview.

#### ***Reflexivity***

In qualitative research, researchers employ reflexivity to acknowledge their biases and the impact of subjectivity on inquiry and its processes, which are inextricably linked (Olmos-Vega et al., 2023; Sarfo, Attigah, 2025). In this study, researchers engaged in reflexivity by assessing their abilities and familiarity with the setting as well as communicating varied decisions while generating real-life data to portray participants' experiences.

### **3. Results**

Data saturation was obtained from the fifteenth participant. All participants who met the inclusion criteria agreed to participate without withdrawing from the study at any point. The demographic Characteristics of the study participants are presented in Table 1.

**Table 1.** Demographic characteristics of study participants

Pseudonyms	Age	Occupation	No. of Children	Age of Baby (in months)
Cm1	29	Nurse	1	1
Cm2	33	Secretary	4	1
Cm3	31	Nurse	2	1
Cm4	34	Nurse	2	4
Cm5	32	Nurse	3	5
Cm6	32	Nurse	3	3
Cm7	36	Pharmacy Technician	3	9
Cm8	33	Teacher	1	2
Cm9	29	Teacher	1	2
Cm10	24	Nurse	1	2
Cm11	32	Nurse	2	1
Cm12	31	Nurse	2	2
Cm13	32	Midwife	2	9
Cm14	29	Midwife	2	7
Cm15	29	Midwife	2	12

### **Organisation of themes and subthemes**

Two major themes and seven subthemes emerged from the study, as described in [Table 2](#).

**Table 2.** Themes and sub-themes

Theme	Sub-Themes
Workplace challenges	a. Time constraints
	b. Work schedule
	c. Workplace policies
	d. Workplace environment
Maternal challenges	a. Conflict between work and breastfeeding
	b. Maternal stress
	c. Maternal stigma and discrimination

### **Theme 1: Workplace challenges**

Career mothers encountered numerous challenges at the workplace as they tried to meet the demands and practice exclusive breastfeeding, as expressed in the data. Work role challenges include time constraints, workplace policies, conflict, the impact on mothers and children, stigma, discrimination, and discouragement from co-workers.

#### **Time constraint**

Most of the participants complained about limited break time and difficulty breastfeeding due to time constraints at work, and the demanding nature of work makes it difficult to find time to breastfeed.

*“Resuming work in the third month and then sending the baby to work. Putting a baby at the breastfeeding corner while working, when the work becomes serious, you will not get the time to really feed the baby up to expectations” (CM14).*

*“Sometimes you just end up even deviating from the exclusive breastfeeding because of time constraints. The fact is that it’s not everyone who can practice exclusive breastfeeding” (CM3).*

Some have stopped exclusive breastfeeding practices before six (6) months due to time constraints and workload. Below are some views from participants regarding time constraints.

*“I had no option, that was why I introduced complementary feeding, but it’s not that I don’t believe in exclusive breastfeeding. Even though it was risky, I had to opt for it because I wanted my babies also to grow so that I could get a chance to work” (CM2).*

*“So when I resumed work, I had to supplement or complement with other food because the time you have to breastfeed at least every two hours, you will be working, and that is why almost*

*everybody in my ward, it's difficult for us to practice exclusive breastfeeding. It has gotten an impact ... because the time you would have given to the baby, you are working" (CM13).*

#### **Work schedule**

Most women expressed dissatisfaction with their work schedules since they frequently conflicted with breastfeeding demands, especially for nursing and midwifery services, due to insufficient staff per shift.

*"It's tedious for us, the breastfeeding mothers. Because when we are at the worksite, especially in the afternoon shift, before they will come and take over from us, it will be around 7:30 before you take over or before you hand everything over to the incoming nurse. It will be getting to 8 pm or 9 pm at that time in the evening" (CM4).*

*"So, sometimes you wish to go and breastfeed, but the place is busy. If you ask for permission, they will tell you that the place is busy. Assuming you are two or three people who are breastfeeding and you are on duty, all of you cannot all go at the same time to breastfeed. So, it might be that your baby is crying, and another person's baby is crying too. So, it's only one person they will allow to go and breastfeed at a time" (CM13).*

#### **Workplace policies**

The study indicates that workplace policies and the environment have a significant influence on breastfeeding practices, with participants expressing concerns about the inadequacy of the government's 3-month maternity leave policy.

*"Because the practice of exclusive breastfeeding is six months, and we are given three months maternity leave, so if you use three months at home, when you come back to your workplace, it will be difficult to continue breastfeeding" (CM6).*

*"Actually, it's not enough. We always get three months. Actually, within the first three months that I was in the house, I was on maternity leave, I was able to breastfeed exclusively, but when I resumed work, I could not continue exclusive breastfeeding" (CM13).*

#### **Workplace environment**

Many career mothers face challenges in exclusive breastfeeding due to a lack of workplace support, inadequate breastfeeding areas, privacy, and staff restrooms.

*"Nobody is having a place for breastfeeding, so we don't even have a nurse's office or nurse's station. There's no privacy in the ward, so it is difficult sitting there exposing yourself and breastfeeding your child" (CM1).*

*"So the moment you are removing your seat to bring the breast out, everybody's eyes are on you. So you see that you'll not be comfortable bringing the breast out" (CM4).*

### **Theme 2: Maternal challenges**

Career mothers also reported personal parenting challenges practising exclusive breastfeeding. These maternal challenges included conflict between work and breastfeeding, maternal stress and maternal stigma and discrimination.

#### **Conflict between work and breastfeeding**

Workplace conflicts negatively impact breastfeeding mothers, with tight schedules and demanding workloads causing frustration and difficulty in attending to the infants' needs.

*"So when I resumed work, I had to supplement or complement with other food because the time you have to breastfeed at least every two hours, you will be working, and that is why almost everybody in my ward, it's difficult for us to practice exclusive breastfeeding. It has gotten an impact. Because the time you would have given to the baby, you are working" (CM13).*

*"The time you will be busy teaching, that's the time your child wants to breastfeed. You don't know whether to attend to the baby or continue teaching. So, it has been my challenge" (CM8).*

#### **Maternal stress**

The results revealed that balancing work and breastfeeding demands can cause psychological strain, leading to divided attention and stress among mothers who may need to leave work to care for their infants.

*"So sometimes I would want to breastfeed much and also want to execute my work professionally and take care of the client's work. So psychologically, if you are not stable, you can't also take good care of the client's needs" (CM13).*



*"Yes. As I spoke about stress, I personally, when I'm stressed out, all my breasts run empty. You will not see anything in my breasts. They can stress you till you even get depression. If you are not strong and your family are not helpful to you, you can get depression out of it. You see, my mind will not be stable. So maybe I can cause harm to the client or baby" (CM14).*

#### **Maternal stigma and discrimination**

It was deduced that most breastfeeding mothers face stigma and discrimination in the workplace. These mothers described how they suffered the effects of discrimination in the hands of their employers. A breastfeeding mother can only be employed or offered a job when there is no competitor, or it is the last option for the employer.

*"They will never give you a job because you are breastfeeding or someone is breastfeeding. If you are two or more people and you are looking for work, the moment they see you carrying baby at your back, no one wants to pick you because they feel like you can't get a chance to work well so they will rather choose the one without a child because the person is free unless maybe there is no one else to do it and you are the only option" (CM2).*

*"The co-workers feel like they've never given birth before or something. You don't even understand. And my boss would say, 'You give your child too much attention.' Mm-hmm. So they will just be murmuring, and you see, those are the things that will give you emotional trauma and stuff" (CM11).*

#### **4. Discussion**

The challenges and difficulties the career mothers faced in this current study in meeting their breastfeeding and work demands included limited time and work schedule when returning to work, inadequate work policies and support, such as limited maternity leave, discrimination, discouragement and stigma from co-workers, and physical and psychological stress.

According to the current research, many mothers struggle to find time to breastfeed their newborns at work or after resuming work, making exclusive breastfeeding practically impossible. Similarly, a study conducted in Dukem Town of Central Ethiopia indicated that mothers' cessation of exclusive breastfeeding was related to short or limited breastfeeding break time (Kebede et al., 2020).

From the study findings, there is a need for the government to reduce working hours for breastfeeding mothers in Bunkpurugu District, as they face physical and psychological stress due to their professional roles and motherhood demands. This agrees with similar study findings by Valizadeh et al. (2018), which stated that stress was a rising issue for all employees, but more particularly for working breastfeeding mothers. This study found that working mothers experience emotional stress, worry, and instability in their daily endeavours, corroborating previous Ethiopian findings (Wolde et al., 2022). Additionally, it supports the notion that the dual role of work and breastfeeding may lead to maternal physical and mental exhaustion (Guo et al., 2022). This revealed that career mothers often prioritise work and family responsibilities, sacrificing personal time for rest and self-care, resulting in a lack of balance in their lives.

The study revealed that some breastfeeding mothers in the district encounter discrimination from superiors and co-workers, resulting in a hostile work environment that makes it difficult for them to manage their work and breastfeeding duties (Hendarto et al., 2018). The study corroborates the findings that criticism and discouragement from employers and co-workers greatly reduce breastfeeding mothers' ability to continue practising exclusive breastfeeding (Hirani, Karmaliani, 2013; Jantzer et al., 2018). This study found that workplace policies, including flexible hours and supportive conditions such as lactation rooms and maternity leave, were often inadequate. Despite using three months of maternity leave, the majority of participants complained about its inadequacy, consistent with Ethiopian findings indicating that the existing 3-month maternity leave is unjust and brief, failing to meet the global exclusive breastfeeding standard (Wolde et al., 2021). This finding suggests that the country's maternity leave policy is inadequate, thereby not providing career mothers with the opportunity to work full-time and practice exclusive breastfeeding as recommended.

According to the study, some mothers started formula feeding after returning to work because their work environment conflicted with exclusive breastfeeding practices, and this is supported by findings that indicated that working mothers frequently forfeit breastfeeding for work in China, despite recognising its benefits, instead resorting to formula feeding due to job-related difficulties (Chen et al., 2019; Tulley, 2015; Wolde et al., 2021).

The study found that many participants struggled with work role challenges, citing a lack of breastfeeding or lactation rooms, leading them to use offices or consultation spaces to breastfeed their babies. Similarly, in the USA, employed mothers struggle to find suitable spaces to breastfeed and express milk at work, and as a result, mothers in Ghana often resort to car or office breastfeeding (McCardel, Padilla, 2020; Kubuga, Tindana, 2023).

Moreover, some mothers also introduced formula feeding early due to the conflict between work demand and exclusive breastfeeding practice, which is supported by a study in the USA that suggests that some mothers quit breastfeeding earlier due to potential work-related conflicts. (Van Egdom et al., 2023). Workplaces may be hostile towards breastfeeding mothers, suggesting that the government and authorities should implement policies to prevent workplace barriers and discourage formula-feeding practices.

## 5. Conclusion

The study concludes that most working mothers have a strong desire to practice exclusive breastfeeding for the recommended six months because of its recognised benefits for infant health and development; however, workplace challenges may prevent them from achieving this goal. These conclusions highlight the complexities surrounding breastfeeding practices among working mothers and underscore the need for systemic changes to support their efforts.

## 6. Strengths and limitations

Participants from different facilities provide rich information that helps them appreciate the challenges that career mothers face in their efforts to balance professional demands and motherhood responsibilities. The study focused on the health and educational sectors for participant recruitment, leaving other sectors where career mothers might have provided additional or different information.

## 7. Implications of the study

Nursing and midwifery professionals should provide more comprehensive support for breastfeeding mothers. This includes educating mothers about the importance of exclusive breastfeeding and providing practical support in managing breastfeeding alongside work responsibilities.

Educators should equip future nurses and midwives with advocacy skills that will help promote and improve policies supporting breastfeeding mothers in their workplaces. This will empower them to be effective advocates of maternal and child health.

## 8. Declarations

### ***Ethics statement and consent to participate***

Ethical clearance was obtained from the Nugochi Memorial Institute for Medical Research (NMIMR) Review Board with NMIMR-IRB CPN: 130/23-24.

### ***Consent for publication***

Not applicable.

### ***Availability of data and materials***

Raw data is available upon request from the corresponding author.

### ***Conflict of interest***

The authors have declared that no competing interests exist.

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### ***Authors' contributions***


This study was designed by all authors (F.M.D., E.A.A., M.A.A., and E.Y.). The manuscript was written and reviewed by all the authors. All authors have read and approved the manuscript.

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## A Christological Reflection on Ritual Bathing and the Wearing of Black Cloth in *Kunlanehyile* (Widowhood Rite) among the Nzema People of Ghana

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### Abstract

Traditional rites are an integral part of many societies because they express the beliefs and values of people groups. One such rite is a funeral celebration through which people's religious traditions are expressed. For the Nzema people of western Ghana, the widowhood rite is used to fulfil key socio-religious requirements, thereby facilitating the reintegration of widows into society. There are various existing scholars on the Nzema people who lack a theological examination of the Nzema widowhood rite. This paper fills this research gap by assessing widowhood as practised by the Nzema people from a Christological perspective. Specifically, two key widowhood traditions, namely, wearing black cloth and the rite of separation and integration, were examined in light of the biblical practice of wearing sackcloths to ascertain how Akan Christians could make meaning of widowhood. The paper argued that the widowhood rites of the Nzema people could be given a Christian expression to purge them of any potential 'fetish' practices that are associated with them. This perspective, in a way, would strengthen the Christian faith in the Nzema community in a more realistic and relevant way.

**Keywords:** Cleansing, Foazinli, Kunlanehyile (Widowhood Rite), Nzema, Ritual bathing.

### 1. Introduction

Customary rites form an integral part of many human societies in Africa. These practices reveal the beliefs and values of a particular group of people or community that have been formulated over a long period (Boaheng, 2018). Examples of such practices are marriage, birth rites, funeral rites, puberty rites, and widowhood rites. Traditional customs vary from one location to another in terms of their character and length. For instance, the celebration of funerals differs from society to society (Boaheng, 2018). Even among different communities of the same tribe, there may be remarkable differences when the details of the rites are considered.

Before the advent of Christianity in Africa, these rites were purely traditional and were passed down through the teachings of African Traditional Religion (Hastings, 1967). The introduction of missionary Christianity into Africa brought a confrontation between the Christian faith and African culture and traditions (Boaheng, 2018). The missionaries saw the African culture as incompatible with Christianity (Hastings, 1967). In the process, some of the

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traditional rites were branded as evil or fetishistic rituals. Mission churches prohibited their converts from participating in traditional practices, including funeral celebrations, festivals, drumming and dancing, and singing traditional songs, among others (Ansre, 2016; Boaheng, 2018). The widowhood rite is one such practice that is more often associated with evil. Without an adequate understanding of cultural practices, one stands the chance of condemning them without just cause. The need for a theological assessment of indigenous practices, particularly those related to funerals, is therefore an urgent theological concern.

This paper offers a critical examination of the widowhood practice (*Kunlanehyile*) among the Nzema people of western Ghana. In this rite, a widow (Nzema: *kunla*) goes through two phases of the ritual, which are the first week after burial and the last eleven months, three weeks before she finally cleanses herself in a river called Tanoe to complete the process (Participant 2, 48 years, Widowed for 6 years). The rite has been examined from various perspectives, but with little serious engagement from a theological viewpoint. This paper fills the research gap by assessing widowhood as practised by the Nzema from a Christological perspective, with an emphasis on the black cloth the widow wears during rituals and the final cleansing rituals. The paper contributes to the contextualisation of Christianity in the Ghanaian/African society.

## 2. Conceptual framework

### **Religious Worldview of the Nzema People**

More than 100,000 “Nzema” (or Nzima) are Akan people who reside in the coastal region between the Ankobra River in Ghana’s Western Region and the Assinie in the Ivory Coast (Nrenzah, 2008). In Côte d’Ivoire, many Nzema also reside beyond the territorial tribal line (Yakub, 2020), particularly in Balsam, near the Ghanaian border, where they form a sizable minority. In Ghana, the Nzema area comprises three administrative districts: Nzema East (or Evalue Gwira) Municipal, Ellembele District, and Nzema West (or Jomoro) Municipal.

Religion permeates everything the Nzema does. The Nzema hold that *Edenkema Nyamenle* (eternal God) is the Supreme Being who created the universe (Nrenzah, 2008). *Edenkema Nyamenle* supplies rain, fertility, sunshine, and all other elements necessary for existence (Nrenzah, 2008). There is also the belief in lower divinities or gods – including sky gods and the earth goddess (*Azele Yaba*) – who are subordinate to God (Nrenzah, 2008). These deities, which reside in rocks, trees, rivers, mountains, and abandoned buildings, are collectively referred to as *awozonle* (singular: *bozonle*). In times of disaster, people may sacrifice to the gods to appease them. Against this backdrop, Nzema’s traditional religious tradition is centred on sacrifices performed by the traditional priest, who mediates between the supernatural and the natural realms.

Humans are at the bottom of the power hierarchy; they have the least power and are susceptible to both good and negative effects from any of the aforementioned creatures (Nrenzah, 2008). Since supernatural powers reward good deeds and punish evildoers, humans must ensure that they do not offend the spirits. The Nzemas also practice matrilineal inheritance. However, they consider lineage as people related by *mbowule* (bones), the part of the body that is structurally robust and long-lasting (Nrenzah, 2008). The Nzema also consider death to be a passage onto an area known as the ancestral world. After passing away, a person’s spirit travels to the world of the ancestors and becomes an ancestor (plural: *Nananom*). It is thought that to be welcomed into the ancestral realm, a person’s corpse must be transported to the graveyard with a large group of people. The foregone worldview of the Nzema people informs their daily activities (Nrenzah, 2008).

### **The concept of widowhood**

A widow is a woman who has lost her husband and has not yet remarried. Widowhood rites are the rituals and customs that women observe after the death of their husbands. A woman who has not been married by the performance of traditional rites (including payment of bride price) or by ordinance is not considered a wife and so does not go through widowhood rites. Concubines are not considered widows as a result, even though they lived together with their deceased “husbands.” Typically, widowhood rites start as soon as the husband passes away (Adeyem, 2016). Even while some tribes’ widowhood rites involve unethical acts, widowhood has some positive repercussions for women. Tasie claims that African widowhood customs are not an example of so-called male chauvinism and were not developed with the intention of demeaning, oppressing, or de-womanising African women. The majority of the time, widowhood ceremonies are conducted for the widow’s overall well-being. Apart from facilitating the grieving process, widowhood may also

prepare the widow to begin life strongly after the process is over (Atindanbila et al., 2014). The goal is to sever the departed spouse's link with the living spouse and ward off evil spirits (Atindanbila et al., 2014). Being a widow is a way to honour your late husband. The foregoing discourse serves as the conceptual framework for the rest of the paper.

### 3. Methods and materials

#### *Design*

This paper employed a qualitative case study design, with interviews conducted from August to November 2022 (Sarfo et al., 2021). This study followed the Consolidated Criteria for Reporting Qualitative Research (COREQ) checklist to ensure the quality of the research (Tong, 2007).

#### *Sampling and sample size*

In this study, we employed purposive sampling techniques to select five widows aged between 27 and 78 years (Sarfo et al., 2021). The inclusion criteria were widows who had lost their husbands and had personal experiences during the passage of the rite. It also included a teacher who interpreted the Nzema language to the authors. The exclusion criteria were women who still lived with their husbands. The researchers decided to use this sampling technique to select Widows and Teachers who provided the relevant information needed to the researchers.

#### *Participants*

The participants in this study included different categories of widows in the Mpataba Community in the Jomoro Municipality of Ghana. See Table 1 for details.

**Table 1.** Characteristics of the participants

Participant	Age (Years)	Years of being a widow	occupation	Religion	Number of Children
1	27	none	Teaching	Christian	none
2	48	6	Farming	Christian	3
3	78	17	Farming	Christian	4
4	63	10	Farming	Christian	5
5	63	10	Farming	Christian	7

#### *Instruments*

The primary instrument for this study was a semi-structured interview guide developed by the researchers to explore participants' lived experiences of widowhood rites among the Nzema people. The guide was designed to elicit detailed, descriptive, and culturally grounded responses. It contained open-ended questions that encouraged participants to narrate their experiences freely and in their own words.

Sample questions included:

- How was the widowhood rite performed after you lost your husband?
- What were your experiences during the performance of the widowhood rites?
- Can you describe some of the rituals performed during the widowhood rite in the Nzema dialect?
- What are some of the challenges associated with Nzema's widowhood rite?

To ensure language accuracy and cultural authenticity, we engaged a native Nzema speaker who is also a language expert, as well as a teacher from the Community Junior High School, to transcribe and translate the Nzema expressions used by participants during the interviews. This collaboration helped preserve the originality and contextual meaning of participants' accounts.

#### *Data collection procedure*

Following ethics approval, data were collected through in-depth, face-to-face interviews with participants who met the inclusion criteria. Before each interview, informed consent was obtained, and participants were assured of confidentiality and their right to withdraw at any stage without any repercussions. The interview locations were carefully selected based on the principle of privacy and comfort, ensuring that participants could express themselves freely without fear or interruption.

The first author conducted all five interviews using a semi-structured interview guide. Each session was audio-recorded with the participants' permission, allowing for accurate transcription and analysis. The duration of the interviews ranged from 30 to 110 minutes, depending on the

depth of responses. Immediately after each interview, recordings were transcribed verbatim by the researchers to maintain the fidelity of participants' narratives. These transcriptions formed the primary data for subsequent analysis.

### **Data Analysis**

Data obtained from the interview guide were edited, recorded, and translated before undergoing in-depth analysis using Microsoft Excel and Microsoft Word applications. Information obtained here was from Widows who provided detailed accounts of how the rite is performed, as well as its effects on their lives. We identified the key themes, categorised them, and determined the phrases consistently associated with the research topic after reading and re-reading the text several times.

### **Trustworthiness and Rigour**

Trustworthiness is considered a more appropriate criterion for evaluating qualitative studies. To ensure the process is trustworthy, Guba and Lincoln's (1989) four models for qualitative research, such as credibility, transferability, dependability, and confirmability, were adopted.

### **Reflexivity**

The authors ensured reflexivity throughout the study process by continuously reflecting on their own biases, assumptions, and positionalities as men, Christian theologians, and researchers (Sarfo, Attigah, 2025). We maintained reflective journals to document their thoughts, decisions, and potential influences on the interpretation of the data. This ongoing self-awareness helped enhance the credibility, transparency, and trustworthiness of the research findings.

### **Ethical consideration**

The protection of human subjects through the application of appropriate ethical principles is crucial in any research study. The protection of human subjects through the application of appropriate ethical principles is important in any research study. The protection of human subjects through the application of appropriate ethical principles is important in any research study.

The study received ethical approval from the University of the Free State. Protecting human subjects by applying appropriate ethical principles, such as informed consent, confidentiality, cultural sensitivity, and continuous consent from participants, which reminded them of their right to withdraw from the interview without penalty, was crucial in this study. Before data collection, the researchers sought the consent (voluntary) of the Widows and their understanding of what was being asked of them. These participants were adequately informed about the research, comprehended the information, and had the freedom of choice to decide whether to participate or decline. Participants' agreement to participate in this study was obtained only after a thorough explanation of the research process. The anonymity and confidentiality of the participants were preserved by not revealing their names and identities during the data collection, analysis, and reporting of the study findings.

## **4. Results**

Through in-depth interviews and data analysis, the process of Widowhood rites among the Nzema people was traced, including the discovery of the true meaning of the Widowhood rite, which is the *Kunlanehyile*, the two phases of the *Kunlanehyile* practice, and the biblical reflections on wearing Black cloth in *Kunlanehyile*. Overall, the culturally sensitive experiences of widows in the *Kunlanehyile* were divided into three main themes and six sub-themes, as shown in Table 2.

**Table 2.** Main themes and sub-themes of the study

Main themes	Sub-themes
Widowhood rite in Nzema, the <i>Kunlanehyile</i>	Widowhood rite in Nzema as the <i>Kunlanehyile</i>
The Phases of <i>Kunlanehyile</i>	The first phase of <i>Kunlanehyile</i> The second phase of <i>Kunlanehyile</i> Finding certain challenges of <i>Kunlanehyile</i>
Biblical reflections on wearing Black cloth in <i>Kunlanehyile</i>	Sackcloth and ashes in the biblical context Religious uncleanness and ritual cleansing in the

Main themes	Sub-themes
	Biblical context Christological Analysis of Widowhood among the Nzemas

### **Widowhood rite in Nzema as the *Kunlanehyile***

The Nzema people refer to their widowhood rite as *Kunlanehyile* (Participant 1, 27 years, Nzema Teacher JHS). *Kunlanehyile* involves seclusion, use of prescribed attire, limitations on sleeping or waking up, avoidance of certain food items, and others. All the interviewees indicated that the rite of widowhood begins a day after the burial of the deceased husband and lasts for a year.

#### **The Phases of *Kunlanehyile***

*Kunlanehyile* among the Nzemas has two phases. The first phase is a one-week, stringent ritual, followed by eleven months and three weeks. Before the process begins, another widow or a woman who has chosen not to remarry is chosen to lead the widow through the first week's rituals. The two phases of *Kunlanehyile* are as follows.

#### **First Phase of *Kunlanehyile***

In expressing her personal experience as a widow, Mrs Abekah told the authors that the first phase of *Kunlanehyile* starts like this: *"The widow is made to sit on a kitchen stool after being forced onto it three times. For the first week following the burial of her spouse, the widow will only sit on the kitchen stools. In the olden days, the widow would traditionally sit on a kitchen stool or sleep next to where her spouse was laid to rest"* (Participant 2, 48 years, Widowed for 6 years).

The widow's cook is the one appointed to oversee the procedure. She follows the custom of eating within a set hour. The supper is taken before 6:00 pm and is eaten in the room. In the olden days, widows who went through *Kunlanehyile* were banned from eating heavy foods during the first three days. Thus, *if the widow cannot totally abstain from food, she is not expected to eat to her satisfaction; neither is she expected to eat her favourite dish* (Participant 2, 48 years, Widowed for 6 years).

In this period, the widow bathes with cold water early in the morning before cockcrows and bathes again in the evening before 6:00 pm. In the olden days, a widow would bathe at dawn at the junction of a cemetery because *she was seen as an unclean (evinle) person, and she was perceived to be accursed (Munzule. It is believed that she is not supposed to bathe in the community where people live to affect them with her uncleanness* (Participant 3, 78 years, Widowed for 17 years). It is anticipated that the widow will go to bed before 6:00 pm. The woman retires to bed before her deceased husband's spirit follows her, so the story goes. The authors were told that, *in the olden days, the widow used to be forced to sleep on a raw mat (Nzema: Foazinli) or any other piece of clothing that was spread out on the floor* (Participant 3, 78 years, Widowed for 17 years). The widow's designated guardian travels with her at all times, regardless of how discreet the itinerary should be. The widow is shielded from the ghost of her late spouse by doing this. A ritual seawater bath at the break of dawn marks the conclusion of *Kunlanehyile*'s initial stage. The widow then washes her own body with clean water. After having a bath, the widow throws away everything she has used on herself over the week, including clothing, jewellery, a mattress, towels, and a sponge. *These objects are believed to be spiritually impure due to their touch with her* (Participant 4, 63 years, Widowed for 10 years).

A mixture (known as ezuvindle) is created from a leaf and kaolin (ewole) on the same day and given to the widow to sprinkle at any crossing or crossroads using an ezumile leaf in a ritual known as yeyilale (fortunate moment). "When I sell, let it be profitable, and when I do anything, let it be well with me," the widow says, sprinkling the concoction. The widow performs this ritual to ward off bad spirits, proclaim her release, and pray for good fortune in her impending "new" life. In each of these, *the widow is joined by her guardian and another individual who may be a member of the widow's family* (Participant 2, 48 years, Widowed for 6 years).

After the sprinkling, the widow is allowed to carry on with her usual activities till the end of the year. But she is supposed to wear only black clothes and red beads around her neck, waist, and wrists till the end of the year. A deceased person's wife will continue to observe mourning as a customary practice of grieving (Elwell, Beitzel, 1988). A bead that she loses from her waist, neck, or wrist while going about her daily activities is never replaced. It is repugnant for such a widow to pluck the beads and reuse them on herself, even though the results are unknown. In this frame of



mind, one of the Widows explains that the widow continues to experience widowhood all year (Participant 4, 63 years, Widowed for 10 years).

### ***Second Phase of Kunlanehyile***

The second phase of the widowhood rite takes place on Thursday (Nzema: *Kule*) when the widow travels to Elena and takes a final purification ritual bath in the Tanoe in the Jomoro District. The widow makes her late husband's finest dish and places it on the table at home before she departs for Elena. This is typically served as fufu, which is made without plantains. She throws away the firewood used to cook the meal as she heads back from the Tanoe River. At Elena, a widow, is led to the riverbank for her ritual cleansing, typically done late at night after a payment is made. *The hair on the head of the widow is also shaved as part of the procedure* (Participant 5, 63 years, obaapanin, Mpataba). Shaving has a cultural underpinning among the Akans. In Akan culture, during the traditional wedding ceremony, a man is required to pay the "head price" (Bono: *tire adel* or *tire nsa*). This ritual of shaving implies that the departed husband has no claim over the widow's hair when it begins to grow again because (the hair) he bought for her on the day of their marriage is no longer there (Boaheng, Asibu-Dadie, 2020). The ritual shaving is also intended to destroy their marriage connection and to rid them of anything the deceased husband touched throughout their marriage. The widow, after cleansing herself with River Tanoe, leaves everything she used on herself (such as the black clothes, rings, towel, sponge, or headgear) for the person in charge of the cleansing process at the river. After the cleansing, kaolin is smeared all over the widow's body with white clothes, earrings, and white sandals to symbolise her total freedom and victory.

It was also found that the widowhood rite in Nzema differs from the one practised by the Axim people, who are also Nzemas. With their process, the widow in question wears black clothes for three months. During the three months, a person chosen for her (the widow) prepares her food. At the end of the three months, the widow bathes in seawater at the seashore and throws away everything she has used on herself during the three months to complete the whole process. No matter the form it takes, one is certain that the Nzemas perform widowhood rites in one form or another without exception.

### ***Challenges Associated with Kunlanehyile***

Among the challenges associated with the practice of *Kunlanehyile* are social exclusion and solitude. The Nzema have a communal worldview of life. The community is prioritised over the individual. A person's existence is intimately connected to that of other people. It is, therefore, not desirable to live alone under normal circumstances, but more so when bereaved. Sadly, widows who require support from those closest to them following the loss of their husbands might not always get it because those who should be doing so distance themselves from these widows. After the burial of one's husband, the wife is taken through a period of solitary confinement for one week. This means the widow has no absolute right to visit neighbours or attend any social gatherings. With these restrictions, these women do not experience the African Communal sense of life, which fosters interdependence, interconnectedness, sharing of resources, and the solidarity that Paul encourages believers to practice in Romans 12:15-16 (NIV, International Bible Society, 2011).

The rite of *Kunlanehyile* also has a negative economic impact on widows. Most traditional Ghanaian cultures rely on the husbands for their everyday needs. Women who are engaged in a form of commercial activity supplement what their husbands provide. In the period of widowhood, the widow is not allowed to undertake any economic activity. They are banned from handling money to buy anything. The widow finds it challenging to have a means of support once the widowhood process is finished, since she is forbidden from engaging in commercial endeavours.

Kunlanehyile's associated isolation results in psychological problems. This claim is supported by Shumbamhini, who claims that isolations increase the impact of a loved one's passing while widows are still grieving (Shumbamhini, 2020). There are several illnesses among them as a result of the widows' profound psychological toll. *"It hurt me in my thinking, and my blood pressure was also shown to be excessive because of my husband's passing, and the fact that I was by myself in this place was on my mind a lot."* (Participant 4, 63 years, Widowed for 10 years)

There is also a social stigma associated with *Kunlanehyile*. Ghanaian widows frequently face accusations from society that they killed their spouses. *'Widow who passes through Kunlanehyile suffer from social stigma because it is sometimes believed that the widow is the cause of the death of her husband.'* (Participant 4, 63 years, Widowed for 10 years). This frequently occurs, especially



when family members are unsure about the husband's cause of death, which makes it easier for people to accuse the widow and spread negative sentiments about her. Widows become the talk of the community during such times.

It is also a belief among certain Nzema people that a widow who has not completed the whole ritual process is spiritually unclean to be associated with. There is the mindset of the uncleanness of the widows, which prevents other people from associating themselves with them. The majority of communities in Nzema still discourage socialising with widows. Some people sternly warn their children and family members not to associate themselves with the widow, all because she is not clean. As a result, the widow endures societal ridicule and eventually isolates herself.

### **Biblical reflections on wearing Black cloth in Kunlanehyile**

#### ***Sackcloth and ashes in the Biblical context***

During the *Kunlanehyile* process, the widow in the *Kunlanehyile* wears black clothes throughout the year as an outward sign of mourning and grief for her beloved husband. This custom has ties to the biblical sackcloth and ashes, which were used as an outward symbol of mourning, repentance, humility, or submission. For example, after Joseph's brothers sold him into slavery and then told their father Jacob that his beloved son had been murdered by a wild animal, Jacob wept over the loss of his son Joseph. Jacob then tore his clothes, put on sackcloth, and mourned for his son many days. All his sons and daughters came to comfort him, but he refused to be comforted. 'No,' he said, 'I will continue to mourn until I join my son in the grave. So, his father wept for him' (Genesis 37:34-35, [NIV. International Bible Society, 2011](#)).

In 2 Samuel 3:31-32 ([NIV. International Bible Society, 2011](#)), David laments the loss of Abner and commands Joab and the rest of his companions to rip off their clothing, wear sackcloth, and weep before Abner. In this act, King David lifted his voice and wept at the grave of Abner, and all the people wept. According to Spence-Jones (2004), while in mourning all those at Hebron had proof that David was innocent, the people generally would know only that, when Abner was treacherously murdered by Joab, who was in charge of David's army and was also the nephew of David at the gate of Hebron, he was accompanying the king's wife back to him and organising for his election to rule over all Israel.

In the book of Esther, it is said that when Mordecai learned all that had been done, Mordecai tore his clothes and put on sackcloth and ashes, and went out into the midst of the city, and he cried out with a loud and bitter cry. He went up to the entrance of the king's gate, for no one was allowed to enter the king's gate clothed in sackcloth (Esther 4:1-2 [NIV. International Bible Society, 2011](#)). Esther 4:3([NIV. International Bible Society, 2011](#)) adds that when the king ordered that all Jews be murdered, Jews mourned in sackcloth and ashes, and fasted and wept. The sound of their weeping echoes Mordecai's loud and bitter cry, and listeners to Mordecai would hear both the cry of one wronged and an appeal for help. Queen Esther does not respond to his actions ([Spence-Jones, Ed. 2004](#)).

A sackcloth is a symbol of repentance and humility before God for our sins, as well as sadness. The penitent was found wearing sackcloth in the book of Jonah and the Ninevites. Jonah's warnings were taken seriously by the Ninevites, who recognised that their wrongdoing had so severely offended God that everyone, from the king to the poor, put on sackcloth and ashes (Jonah 3:5-8, [NIV. International Bible Society, 2011](#)). The inhabitants of Nineveh believed that if they offered God a visible demonstration of their humbling and repentant hearts, God would have pity on them and hold off on punishing them. Similar to Daniel, he went to the Lord God and besought Him for forgiveness for his people's crimes while fasting and wearing sackcloth and ashes (Daniel 9:3, [NIV, International Bible Society, 2011](#)). It is also stated in the book of 1 Kings that "when Ahab heard that the Lord would bring disaster on him and eradicate his descendants because of his sins, he tore his clothes and put sackcloth on his flesh and fasted and lay in sackcloth and went about dejectedly" (1 Kings 21:27, [NIV. International Bible Society, 2011](#)). The Lord recognised that Ahab had humbled himself via this outward show, and because of this, He decided not to unleash the calamity within his lifetime.

A sackcloth is sometimes not only seen as a sign of mourning, but also as a symbol of grief and self-humiliation when people hear words of fear and threat. In 2 Kings 18:13-37 and Isaiah 36:1-22 ([NIV, International Bible Society, 2011](#)), Sennacherib, King of Assyria, confronted all the fortified cities of Judah and captured them. And the king of Assyria sent the Rabshakeh from Lachish to King Hezekiah at Jerusalem to pour out threats upon King Hezekiah. 2 Kings 19:1 ([NIV.](#)

[International Bible Society, 2011](#)) states that as soon as King Hezekiah heard it, he tore his clothes and covered himself with sackcloth and went into the house of the Lord. The king in mourning took two further steps. He went with a heavy heart to the temple to pour out his soul before God and also sent Shebna and the leading priests, all dressed in sackcloth, to meet with Isaiah so that he might hear God's word through his prophet. From the above, it could be concluded that the physical characteristics of wearing sackcloth made it a suitable attire for times of danger, grief, personal and national crisis, and times of distress.

### ***Religious uncleanness and ritual cleansing in the Biblical context***

Throughout history, people of all nations and faiths, including Hindus, Jews, Christians, and even Pagans, have used spiritual baths and ceremonial bathing. It is believed to remove negativity from oneself, celebrate a new season, or have other symbolic meanings. Washing was a physical act that fulfilled a religious purpose by preventing contamination by tangible objects. To return the widow to her normal self after her husband's death, the *Kunlanehyile* demands that she undergo ceremonial purification in the River Tanoe. This can be connected to the biblical framework of ceremonial purification.

Many reasons for uncleanness may be deduced from the Mosaic Law. First, the law provides different commandments regarding animals that are considered clean and those that are forbidden to eat (Leviticus 11:46-47, NIV, [International Bible Society, 2011](#)). Second, illnesses, particularly leprosy, caused a condition of uncleanness (Leviticus 13, 14; 2 Kings 5:1-14, NIV, [International Bible Society, 2011](#)).

Thirdly, body secretions were impure, and depending on how long they were in contact with someone, they could pollute them. Whether during sexual activity (Leviticus 15:16-18 NIV, [International Bible Society, 2011](#)) or unintentionally at night (Deuteronomy 23:10), the release of semen caused uncleanness till evening. According to Leviticus 15:19-24 (NIV, [International Bible Society, 2011](#)), menstruation also caused uncleanness. It was forbidden to engage in sexual activity during that period (Leviticus 15:19-24; 20:18 NIV, [International Bible Society, 2011](#)). Contact with the spittle of an unclean person produced uncleanness for a day (Leviticus 15:8 NIV, [International Bible Society, 2011](#)).

Additionally, uncleanness was brought on by dead bodies. Anyone who touched a dead body was considered unclean for a month and may only celebrate their own Passover after that period (Numbers 19:16, Numbers 9:6-11, NIV, [International Bible Society, 2011](#)). Due to his unique ceremonial duties, the high priest was not even permitted to bury his own parents (Leviticus 21:10-11, NIV, [International Bible Society, 2011](#)).

Lastly, idolatry was the greatest source of spiritual pollution. The entire nation of Israel was defiled because of idolatry, as were the Gentiles (Psalm 106:38; Isaiah 30:22; Ezra 36: 25 Jeremiah 43:12 NIV, [International Bible Society, 2011](#)). In light of this, interaction with Gentiles was believed to result in contamination. According to Zechariah 13:2, the contamination brought on by unclean spirits was closely tied to the defilement brought on by idolatry.

The Bible provides a means of dealing with religious uncleanness. For example, according to Leviticus' priestly laws, bathing is required to cleanse oneself of various contaminating agents, including skin diseases (Leviticus 14:8-9 NIV, [International Bible Society, 2011](#)), sexual activity (Leviticus 15:18 NIV, [International Bible Society, 2011](#)), specific bodily discharges (Leviticus 15:5-6), contact with a dead body (Numbers 19:11 NIV, [International Bible Society, 2011](#)), leprosy (Leviticus 13:3), and menstruation (Leviticus 15:19-30 NIV, [International Bible Society, 2011](#)).

A person could also be purified using ceremonial substances such as the ashes of a red heifer mixed with water (Numbers 19:1-10 NIV, [International Bible Society, 2011](#)), and (in cases of leprosy) cedarwood, scarlet cloth, hyssop, and blood (Leviticus 14:2-9 NIV, [International Bible Society, 2011](#)). Due to the altar's history as the site of sin sacrifice (Leviticus 16:18, 19; Ezra 43: 20 NIV, [International Bible Society, 2011](#)), only blood was acceptable when it came to purifying rituals. In the case of cleansing from sin, the sinner was to be made as white as snow (Psalm 51: 7 NIV, [International Bible Society, 2011](#)).

Purification by Sacrifice is another method of cleansing in the Old Testament. Both ceremonial and moral purity ultimately came through blood sacrifice. According to Leviticus 15:14-30 (NIV, [International Bible Society, 2011](#)), doves and pigeons were offered to purify all bodily fluids except sexual ones. Blood was used as a metaphor for a life given and the death that followed when it was sacrificed. It was thought that the uncleanness brought on by a disease or sin

was conveyed to the sufferer and so eliminated (Leviticus 14:7 [NIV. International Bible Society, 2011](#)). As a result, a sacrifice's death always had a substitutional component. Therefore, the basis for all purification, including that from sickness, was such a substitutionary atoning sacrifice ([Williams, 1960](#)).

In the New Testament, uncleanness is linked to sin. Jesus taught that true defilement came from the sinner's heart and not from outside contamination (Mark 7:14-23; Luke 11:41 [NIV. International Bible Society, 2011](#)). His critique of the ceremonial externalism practised by the Pharisees was a key component of his teaching. The Law was internalised by Jesus. It would be more accurate to say that he compelled individuals to pay attention to the demands made by the Law on their inner life. Just as the widow mourns her departed husband for days, so should one mourn over their sins and guilt before God. The guilt that sin brings must compel the sinner to come to God and seek the forgiveness of sins through the atoning blood of Christ. The word of God can wash and make the sinner clean from the defilement caused by sins (John 15:3, [NIV. International Bible Society, 2011](#)). In actuality, what the blood of bulls and goats only symbolised in the Old Testament sacrifice system, the atonement of Christ was the final remedy for sin and its moral effects (Hebrews 9:13-14 [NIV. International Bible Society, 2011](#)). In contrast to the yearly repeated offerings of the Levitical priests, Jesus made a single sacrifice.

### ***Christological Analysis of Widowhood among the Nzemas***

The main argument of this section is that Christ has already achieved cleansing and protection, which the Nzema widowhood rites seek to achieve for the widow. Therefore, the Christian widow should make Christ central in the period of widowhood and depend solely on him for the necessary protection and cleansing. To this end, Christ invites the widow to the cross of repentance, where people rend their hearts, not their garments, and resolve not to repeat their sinful ways. Christology, the study of Jesus Christ's life and teachings, is central to all Christian theological discourses because Christ is the foundation of the Christian church. In this section, the paper reflects on the ritual bathing and the wearing of black cloth in *Kunlanehyile* among the Nzema People of Ghana from a Christological perspective.

It must be said from the onset that widowhood rites, as performed by any people group, have some pluses and minuses. Therefore, one should not condemn the entire ritual simply because some aspects of it are unacceptable. The church needs to get involved and transform any aspect of the practice that can be proven as unbiblical. Practices such as making the widow sleep with the corpse in the same room, prohibiting the widow from bathing or eating for days, and falsely accusing the widow of having a hand in the deceased husband's death (associated with widowhood practices by some tribes) must be discouraged as they contradict the gospel. In the case of the Nzema rite, none of these unethical practices featured strongly. The practice was seen as something that gives the widow enough time to mourn the deceased husband, helps her to prepare for life without the deceased husband, cleanses her from her ceremonial uncleanness resulting from the death of her husband, and severs her marital union with her deceased husband, among others.

## **5. Discussion**

### ***True Cleansing***

The *Kunlanehyile* rite involves ritual cleansing from uncleanness, which is performed twice: once at the end of the first week and again at the end of the entire period of widowhood. These cleansing rituals can be considered as a shadow of the cleansing that Christ achieved for humanity on the cross through his atonement. They are comparable to the Old Testament cleansing rites, which were performed in anticipation. Bediako describes the efficacy, completeness, and finality of Jesus' sacrifice as follows: "The Lord Jesus achieved permanent salvation for those who ceased from their acts of purification and put their faith in him and his flawless Odwira (Cleansing), i.e., Christ himself, who has become our Odwira (the Twi phrase used here, *ode n'ankasa ne ho*, is more evocative than the English equivalent). Through Jesus Christ's death, the "Odwira to end all odwiras" has occurred ([Bediako, 2000](#)). Given this fact, the *kunla* must appreciate that it is Christ who offers true purification from sin. From the Christological perspective, sin is the main cause of spiritual uncleanness. The New Testament believer does not become spiritually defiled by what they eat, childbirth, or the touch of a corpse, but by sin (Mark 7:14-19; Colossians 2:16-17; 1 Timothy 4:1-4 [NIV. International Bible Society, 2011](#)). Therefore, it is necessary to acknowledge Christ's superior cleansing power when performing the ceremonial cleansing for the widowhood

process. Christ is the sanctifier, so the ritual should have no other object of worship. The purification rite is a reminder of daily cleansing by the blood of Jesus from sin.

### **Protection by Christ**

Satan has dominion over humankind because of sin. The death of Christ secured the believer against attacks from evil powers. Agyarko claims that Jesus' victory over the spiritual world, particularly over the forces of evil, provides the solution to the question of why there should be a strong guardian against such forces and powers (Agyarko, 2009). For many Africans, the cross is not only about sacrifice but also about victory won by a mighty Warrior, Christ.

Death and the host of evil powers became powerless when Jesus died (Hebrews 2:14, Colossians 2:15 NIV. International Bible Society, 2011). Kuma (2011) alludes to this fact when she refers to Jesus as the person who yelled at Death, and it fled from his face, the first-born Child who is aware of Death's cure, the barrier that prevents Death from entering and causes many hearts to leap for pleasure, and the person who yelled at Death and it fled from his face. For Jesus to shout at death and have death run from his presence means death has no power over Jesus; no wonder it could not hold Jesus captive. The author of the Epistle to the Hebrews underlines the victory Jesus won on the cross against Satan and his hosts of forces when he says, Jesus incarnated so that through death, he might destroy the one who has the power of death, that is, the devil and free all those in bondage to death's power. Given this fact, the Nzema *kunla*, who has given her life to Christ, must appropriate the protection that Christ's death offers believers. There is no need to fear ghosts, as the protection Christ offers is sufficient.

### **Penitence**

The ritual wearing of black cloth compares well with the wearing of sackcloth and sitting in ashes by the ancient Israelites. The sackcloth was meant to express sorrow and repentance (Jonah 3:8 NIV. International Bible Society, 2011). The Asante-Twi version of Jonah 3:8 translates the sackcloth as mourning cloth, which is the same as the cloth worn by the *kunla* during the widowhood rite. Therefore, the wearing of black cloth has both a penitential and mournful connotation. This, however, is an external dimension of repentance.

From a Christological perspective, genuine repentance is an internal rather than an external phenomenon. There is no relevance in putting on a sackcloth if this outward sign is not rooted in internal transformation. The paper, therefore, urges the *kunla* to use the period of seclusion to assess their lives and repent of all sins, asking for forgiveness from God. This way, they will be renewed both physically and spiritually to begin a new life when they are reintegrated into society.

## **6. Conclusion**

This paper describes the Nzema widowhood rite (*Kunlanehyile*) and the challenges associated with this practice. It was noted that during the *Kunlanehyile* process, the widow in the *Kunlanehyile* wears black clothes throughout the year as an outward sign of mourning and grief for her beloved husband. It is related to sackcloth and ashes in a biblical context, which was also an outward sign of mourning, repentance, abasement, or submission, with various examples from the Old Testament. The paper has also noted that the widow is seen as unclean, which the paper relates to uncleanness from the Mosaic Law, where several causes of uncleanness can be derived from its ritual cleansing in the biblical context. However, from a New Testament perspective, what renders a person unclean is sin, which necessitates repentance and genuine cleansing through the blood of Jesus. To conclude, the Nzema *kunla*, who has given her life to Christ, must appropriate the protection that Christ's death offers believers and not entertain fear of ghosts. She is not to be put to fear that, without cleansing in the River Tanoe, something dangerous could happen to her. She should believe that the protection that Christ offers is enough.

## **7. Limitations and Strengths**

The study was conducted in the Mpataba community, Jomoro Municipality, Western Region, Ghana. This might have limited the potential of generalising our findings to other widowhood rites in other cultural settings. However, the interpretation of the findings should be done with care.

However, this study explored the cultural sensitivity of widows among the Nzema people, giving us a unique understanding of and insight into *Kunlanehyile*. This study focused on widowhood rites among only the Nzema People within the Jomoro municipality. Participants' religious beliefs were not captured in this study. Future research should consider this information.



Finally, for this study, data analysis was not performed for the inclusion criteria of the participants' current experiences with the introduction of Christianity. The findings present the true meaning of Kunlanehyile, its various phases, and its effects on participants within this municipality. It might be meaningful to recruit participants from different cultural backgrounds to realise how different widowhood rites affect the cultural sensitivity of widows.

## 8. Declarations

### **Ethics approval and consent to participate**

Ethical approval: CSUC/EA/01/2023; Institutional approval: CSUC-REC2023/01/07

### **Consent for publication**

Not applicable.

### **Availability of data and materials**

Raw data is available upon request from the corresponding author.

### **Conflict of interest statement**

The authors do not have any personal or financial interest in this study.

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### **Authors' contributions**



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Conceptualisation: LVM, SHM, methodology, data curation, data analysis: LVM, SHM, and DMN, writing – original draft preparation, writing: LVM, SHM, and DMN; writing – review and editing: LVM, SHM; writing – supervision: LVM, SHM and DMN; funding – LVM. All authors have read and agreed to the final version of the manuscript for publication.

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