Project Management Practices and the Effectiveness of Polio Emergency Operations Centres in Nigeria: Evidence from Damaturu, Yobe State.

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ABSTRACT

Polio eradication remains one of the most critical public health priorities in Nigeria despite significant improvements in immunization coverage and disease surveillance over the past decade. The effectiveness of Emergency Operations Centres (EOC) in coordinating eradication campaigns has increasingly been linked to the adoption of structured project management (PM) practices. This study examined the impact of project management practices on the effectiveness of polio EOC in Damaturu, Yobe State, Nigeria. The study adopted a qualitative case study design guided by the Project Management Body of Knowledge (PMBOK®), Systems Thinking Theory, Agile Project Management, and Stakeholder Theory. Data were collected through semi-structured interviews with five purposively selected EOC personnel comprising public health specialists, logistics coordinators, monitoring and evaluation officers, and community engagement officers. Thematic analysis following Braun and Clarke's six-step framework was used to analyse the data.

The findings revealed that hybrid PM approaches integrating PMBOK® structure, Agile adaptability, and Systems Thinking significantly improved operational coordination, stakeholder engagement, monitoring and evaluation, and responsiveness to logistical and security challenges. The study further established that digital innovations, adaptive microplanning, and participatory stakeholder engagement contributed substantially to vaccination coverage and campaign effectiveness. However, challenges such as inconsistent PM frameworks, inadequate digital infrastructure, donor dependency, weak institutionalisation of PM roles, and insecurity continued to hinder sustainability. The study concludes that institutionalising context-sensitive hybrid PM frameworks, strengthening local capacity building, and integrating digital systems into public health governance are essential for sustaining polio eradication efforts in Nigeria and similar fragile environments.

Keywords: Project Management, Polio Eradication, Emergency Operations Centres, Public Health Intervention, Agile Management, Nigeria

INTRODUCTION AND LITERATURE REVIEW

Project management has emerged as a critical strategic discipline in public health interventions, particularly in the management of complex disease eradication programmes and emergency health responses. In recent years, governments, international development agencies, and non-governmental organisations have increasingly integrated project management methodologies into public health systems to improve efficiency, coordination, accountability, and sustainability (Turner & Müller, 2019). In the context of infectious disease control, project management practices have become indispensable for coordinating stakeholders, managing risks, allocating resources, monitoring progress, and achieving targeted health outcomes (Zada et al., 2023). This is particularly relevant in Nigeria where polio eradication initiatives have faced operational, infrastructural, and socio-political challenges over the years.

Nigeria's efforts toward polio eradication have undergone substantial transformation since the establishment of the Global Polio Eradication Initiative (GPEI). Although Nigeria was officially declared free of wild poliovirus in 2020, sustaining this achievement remains a major public health concern due to recurring vaccine-derived

poliovirus outbreaks, weak health infrastructure, insecurity, vaccine hesitancy, and logistical barriers, especially in the northern regions of the country (WHO, 2021). Consequently, Emergency Operations Centres (EOC) were established to improve coordination, strategic planning, resource mobilisation, and surveillance activities during immunisation campaigns and outbreak responses (Gidado et al., 2023).

Damaturu, the capital city of Yobe State, presents a particularly significant case for examining the role of project management in public health interventions. The region has historically experienced insurgency-related insecurity, infrastructural decay, poor healthcare access, and high levels of population displacement, all of which complicate immunisation campaigns and disease surveillance operations (Lawal, 2023). Within such fragile environments, effective project management becomes essential in ensuring timely vaccine delivery, efficient stakeholder coordination, adaptive planning, and effective monitoring systems.

The Project Management Body of Knowledge (PMBOK®) framework developed by the Project Management Institute remains one of the most widely applied frameworks in managing public sector projects and health interventions globally. The framework provides structured processes involving initiation, planning, execution, monitoring, and closure, alongside knowledge areas such as risk management, stakeholder management, communication management, and resource allocation (PMI, 2021). In Nigeria's public health context, PMBOK® principles have contributed to improved coordination of immunisation activities and emergency response operations through structured scheduling, monitoring systems, and accountability mechanisms (Varajão et al., 2024).

However, scholars have criticised the rigid and linear orientation of PMBOK® when applied to volatile and unpredictable environments such as conflict-prone areas in northeastern Nigeria. Davies and Hall (2023) argued that PMBOK® assumes relatively stable operational conditions and therefore may not adequately accommodate rapidly changing realities such as insecurity, displacement, vaccine resistance, and logistical disruptions. Similarly, Lawal (2023) contended that the procedural rigidity of PMBOK® may hinder the flexibility required during emergency health interventions. These criticisms have stimulated growing interest in hybrid project management approaches that combine traditional project management structures with adaptive methodologies such as Agile Project Management and Systems Thinking.

Agile Project Management has increasingly gained relevance in public health interventions because of its emphasis on iterative planning, adaptability, stakeholder collaboration, and rapid response to changing operational conditions (Príncipe et al., 2023). Agile approaches allow health teams to continuously reassess operational realities, modify implementation strategies, and respond rapidly to emerging threats and disruptions. In conflict-affected settings such as Yobe State, Agile methodologies have supported adaptive microplanning, flexible deployment strategies, and real-time decision-making processes.

Systems Thinking Theory also provides a useful framework for understanding the interconnected nature of public health systems. The theory recognises that health interventions operate within complex ecosystems involving political, social, technological, cultural, and institutional variables (Fieldhouse, 2023). Within the context of polio eradication, Systems Thinking enables project managers to understand how factors such as insecurity, community trust, vaccine logistics, funding structures, and stakeholder behaviour interact to influence campaign outcomes.

Stakeholder Theory developed by Freeman (1984) further explains the importance of inclusive stakeholder engagement in achieving project success. Polio eradication campaigns require collaboration among government agencies, donor organisations, healthcare workers, religious leaders, traditional rulers, civil society groups, and local communities. Effective stakeholder engagement improves trust, promotes vaccine acceptance, enhances communication, and facilitates local ownership of interventions (An et al., 2023).

The literature identifies several critical success factors that influence the effectiveness of project management in polio eradication efforts. One of the most important factors is leadership and governance. Transformational and adaptive leadership approaches improve coordination, motivation, strategic alignment, and responsiveness during immunisation campaigns (Chenge, 2024). Decentralised governance structures within EOC also enhance accountability and facilitate context-sensitive decision-making processes.

Monitoring, Evaluation, Accountability, and Learning (MEAL) systems represent another major success factor.

Effective MEAL systems facilitate real-time tracking of campaign progress, identification of gaps, adaptive learning, and evidence-based decision-making (McKee, 2021). Digital technologies such as Open Data Kit (ODK), GIS mapping systems, DHIS2 platforms, and real-time dashboards have substantially improved operational efficiency and surveillance activities in Nigeria's immunisation campaigns.

Resource mobilisation and supply chain management are equally important to successful polio eradication initiatives. Lean logistics principles, real-time tracking systems, and predictive forecasting tools improve vaccine distribution efficiency, minimise wastage, and strengthen cold-chain management systems (Lindsay & Aitken, 2024). In Yobe State, the integration of digital logistics platforms and GIS-based microplanning has contributed to improved immunisation coverage and reduced vaccine spoilage.

Risk management and resilience building also play a significant role in fragile and conflict-affected regions. Project managers must continuously identify, assess, and mitigate operational risks including insecurity, community resistance, transportation barriers, and funding uncertainties (Gidado et al., 2023). Agile and contingency-based planning frameworks improve the resilience of EOC by enabling rapid adjustments to changing field realities.

Community engagement and behavioural change communication have also been identified as essential components of effective project management in immunisation campaigns. Behavioural theories such as the COM-B framework and Health Belief Model demonstrate how beliefs, perceptions, and social influences shape vaccination behaviour (Michie et al., 2011). Studies in northern Nigeria have shown that engaging traditional rulers, religious leaders, and local influencers significantly reduces vaccine resistance and improves immunisation acceptance (Gidado et al., 2023).

Despite these improvements, several challenges continue to hinder the effective implementation of project management practices in Nigerian public health interventions. One major challenge is the inconsistency and fragmentation of PM frameworks across health programmes. Many EOC operate without standardised PM methodologies, leading to weak coordination, poor documentation, and inconsistent risk management practices (Ongesa et al., 2025).

Human resource limitations also undermine project management effectiveness. Nigeria's health system faces shortages of trained PM professionals, weak institutional capacity, and high dependency on donor-funded technical support (Umeh et al., 2020). Furthermore, weak digital infrastructure, fragmented information systems, and poor inter-agency coordination reduce the effectiveness of data-driven decision-making processes.

The experience of eHealth Africa in Yobe State provides a useful example of how hybrid PM approaches can improve immunisation outcomes. eHealth Africa integrated PMBOK® structures, Agile methodologies, GIS-based planning systems, and digital dashboards to improve campaign coordination, logistics management, stakeholder engagement, and real-time monitoring (McKee, 2021). Through adaptive microplanning and data-driven decision-making, immunisation coverage reportedly increased significantly between 2018 and 2022.

The literature therefore suggests that no single project management framework is sufficient for managing public health interventions in volatile environments. Instead, a hybrid model combining structured governance systems with adaptive planning, digital innovation, stakeholder engagement, and systems thinking appears more suitable for sustaining polio eradication efforts in fragile settings such as Damaturu, Yobe State.

METHODOLOGY

This study adopted a qualitative case study design to evaluate the impact of project management practices on the effectiveness of polio Emergency Operations Centres (EOC) in Damaturu, Yobe State, Nigeria. The qualitative approach was considered appropriate because it allowed the researcher to explore participants' experiences, perceptions, and operational realities in depth within the context of public health emergency management (Braun & Clarke, 2023). The study was guided by the philosophical assumptions of positivism and realism, which emphasise empirical observation, objectivity, and systematic investigation of social phenomena (Saunders et al., 2019).

The research adopted a deductive approach in which existing project management theories and frameworks were examined within the context of polio eradication interventions. Theoretical foundations for the study included the PMBOK® framework, Agile Project Management, Systems Thinking Theory, and Stakeholder Theory. These frameworks informed the development of interview questions and guided the interpretation of findings.

The study focused specifically on the polio Emergency Operations Centres operating within Damaturu, Yobe State. Damaturu was selected because of its historical vulnerability to polio outbreaks, fragile healthcare infrastructure, security challenges, and strategic importance in Nigeria's immunisation programmes. The case study design enabled the researcher to generate context-specific insights into the role of project management practices in improving public health outcomes.

Primary data were collected using semi-structured interviews. The interview method was selected because it allowed participants to provide detailed explanations and practical insights into project management practices within EOC. Semi-structured interviews also enabled flexibility during discussions while ensuring alignment with the study objectives (Anwar et al., 2024).

A purposive sampling technique was employed to select participants who possessed direct operational experience in polio eradication activities. Five participants were selected from different functional units within the EOC system to ensure diversity of perspectives and rich contextual data. The participants included two public health specialists, one logistics coordinator, one monitoring and evaluation officer, and one community engagement officer. Their professional experience ranged from eight to sixteen years in public health and project coordination.

The interview guide was developed in alignment with the research objectives and existing literature on project management in public health interventions. The interview questions focused on areas such as project planning, stakeholder engagement, monitoring and evaluation, risk management, logistics coordination, digital innovation, and operational challenges. Prior to data collection, the interview guide was pilot tested with experienced public health practitioners to improve clarity, reliability, and relevance.

Ethical considerations were strictly observed throughout the research process. Participants were provided with information sheets, consent forms, and explanations regarding the purpose of the study. Participation was voluntary, and participants were informed of their right to withdraw at any stage without consequence. Confidentiality and anonymity were maintained through the use of pseudonyms and removal of personal identifiers during transcription and reporting.

Data analysis was conducted using thematic analysis based on Braun and Clarke's (2023) six-step framework. The interviews were transcribed verbatim and reviewed repeatedly to ensure familiarity with the data. Initial codes were generated from recurring concepts and operational themes related to project management practices. The codes were then grouped into broader themes including adaptive planning, stakeholder engagement, digital innovation, risk management, monitoring and evaluation, and institutional challenges.

Thematic analysis was selected because it facilitates systematic interpretation of qualitative data while allowing patterns and relationships to emerge from participants' experiences. To improve reliability and transparency, coding procedures were carefully documented, and themes were cross-checked against the research objectives and literature. The findings were subsequently interpreted in relation to existing theories and empirical studies on project management and public health interventions.

Overall, the methodological approach provided a comprehensive understanding of how project management practices influence the effectiveness of polio EOC in Damaturu, while also generating practical insights relevant to public health policy and emergency response systems in Nigeria.

RESULTS AND DISCUSSION

The findings of this study revealed that project management practices significantly influenced the effectiveness of polio Emergency Operations Centres (EOC) in Damaturu, Yobe State. Analysis of the interview data generated several major themes including adaptive planning and hybrid PM frameworks, stakeholder engagement, digital

innovation, monitoring and evaluation systems, logistics management, risk management, and institutional challenges.

One of the major findings of the study was the growing adoption of hybrid project management approaches within the EOC. Participants explained that while formal PMBOK® frameworks were not always fully institutionalised, many operational processes reflected a combination of PMBOK® principles, Agile methodologies, and Systems Thinking practices. Interviewees reported that EOC regularly adjusted operational plans based on emerging realities such as insecurity, vaccine shortages, transportation disruptions, and community resistance.

A senior public health specialist noted that weekly reassessment of operational microplans enabled teams to respond rapidly to changing conditions during immunisation campaigns. This finding supports Príncipe et al. (2023), who argued that Agile methodologies improve responsiveness and adaptability in unstable public health environments. The findings also corroborate Fieldhouse's (2023) position that hybrid PM approaches are more effective in fragile settings because they combine structure with operational flexibility.

The study further revealed that project management practices improved operational coordination within the EOC. Participants explained that planning tools such as work breakdown structures, Gantt charts, GIS mapping systems, and digital dashboards enhanced scheduling, task allocation, resource deployment, and campaign monitoring. The logistics coordinator explained that GIS-based microplanning and digital dashboards improved vaccine distribution efficiency and reduced operational delays.

This finding aligns with Lindsay and Aitken (2024), who emphasised the role of Lean logistics and digital planning systems in improving healthcare supply chains. Similarly, Gidado et al. (2023) observed that digital innovations significantly improved campaign coordination and vaccine coverage in Nigeria's immunisation programmes.

Another important finding was the critical role of stakeholder engagement in enhancing EOC effectiveness. Participants consistently highlighted the importance of engaging religious leaders, traditional rulers, community influencers, healthcare workers, donor agencies, and government officials during immunisation campaigns. The community engagement officer explained that town hall meetings, religious dialogues, and community mobilisation activities substantially reduced vaccine resistance in several communities.

This finding strongly supports Freeman's Stakeholder Theory, which emphasises the importance of inclusive stakeholder participation in achieving project success. The findings also agree with An, et al. (2023), who argued that participatory engagement approaches are more effective than top-down communication strategies in fragile and culturally sensitive settings.

The study also demonstrated the significance of Monitoring, Evaluation, Accountability, and Learning (MEAL) systems in improving project performance. Participants noted that real-time data collection systems and adaptive monitoring mechanisms enabled rapid identification of operational gaps and informed strategic adjustments during campaigns. The monitoring and evaluation officer described how adaptive indicators were recalibrated based on changing community resistance patterns and field realities.

This finding aligns with McKee (2021), who emphasised the importance of adaptive learning systems in public health emergency interventions. The study further supports Braun and Clarke's (2023) argument that thematic and context-sensitive evaluation systems improve organisational learning and evidence-based decision-making.

Digital innovation emerged as another critical theme in the study. Participants explained that digital tools such as Open Data Kit (ODK), GIS systems, real-time dashboards, and electronic reporting platforms improved operational visibility, reduced reporting delays, and enhanced data-driven decision-making. The findings indicated that digital systems significantly improved response times and strengthened surveillance activities.

This result is consistent with Príncipe et al. (2023), who found that digital PM systems reduce crisis response time and improve strategic coordination in health emergencies. However, participants also expressed concerns regarding overdependence on donor-funded digital infrastructure and the lack of sustainable local technological capacity.

Risk management practices were also identified as an essential component of EOC effectiveness. Participants reported that insecurity, transportation disruptions, funding uncertainties, and vaccine resistance represented major operational risks during immunisation campaigns. However, many respondents acknowledged that formal risk registers and structured contingency frameworks were not consistently applied within the EOC.

The logistics coordinator explained that some operational disruptions could have been prevented through more structured risk assessment and simulation exercises. This finding supports Thompson and Badizadegan (2024), who argued that reactive logistics management weakens overall operational efficiency in immunisation campaigns. The findings also reinforce the relevance of contingency theory and adaptive planning frameworks in fragile environments.

Despite the positive contributions of project management practices, the study identified several structural and institutional challenges affecting sustainability. One major challenge was the inconsistency and fragmentation of PM frameworks across public health interventions. Participants reported that many project management practices remained informal, undocumented, and heavily dependent on individual experience rather than institutional systems.

Another major challenge was inadequate human resource capacity. Participants explained that many EOC personnel lacked formal training in project management methodologies. High dependence on donor-funded technical assistance also limited sustainability and local ownership. This finding agrees with Umeh et al. (2020), who highlighted shortages of trained PM professionals within Nigeria's health sector.

Weak digital infrastructure and poor integration of health information systems also hindered operational effectiveness. Participants noted that unreliable internet connectivity, electricity shortages, and fragmented databases limited the efficiency of digital monitoring systems. This finding is consistent with WHO (2022), which emphasised the importance of integrated health information systems for effective public health governance.

Insecurity and infrastructural limitations represented additional barriers to effective project implementation. Participants explained that road closures, insurgency-related risks, and difficult terrain frequently disrupted vaccination campaigns and delayed operational activities. These findings support Lawal's (2023) observation that fragile environments require context-sensitive and adaptive PM frameworks rather than rigid operational structures.

Overall, the findings demonstrate that project management practices significantly improve the effectiveness of polio EOC in Damaturu through enhanced coordination, adaptive planning, stakeholder engagement, monitoring systems, and digital innovation. However, the sustainability of these improvements depends on institutionalising PM frameworks, strengthening local capacity, improving digital infrastructure, and integrating context-sensitive approaches into public health governance systems.

CONCLUSION

This study examined the impact of project management practices on the effectiveness of polio Emergency Operations Centres in Damaturu, Yobe State, Nigeria. The findings demonstrate that project management has become an indispensable component of public health interventions, particularly in fragile and conflict-affected environments where disease eradication campaigns face complex operational challenges.

The study established that hybrid project management approaches combining PMBOK® structures, Agile methodologies, Systems Thinking, and stakeholder-oriented strategies significantly enhanced the operational performance of EOC. Through adaptive planning mechanisms, real-time monitoring systems, digital innovations, and collaborative stakeholder engagement, EOC were able to improve immunisation coverage, strengthen coordination, and respond more effectively to logistical and security-related disruptions.

The findings also confirmed the importance of community engagement and participatory governance in sustaining public trust and reducing vaccine resistance. Community dialogues, religious engagement strategies, and locally driven communication frameworks improved acceptance of immunisation campaigns and strengthened collaboration between health authorities and local populations.

Furthermore, the study demonstrated the value of digital technologies in improving data management, surveillance, logistics coordination, and evidence-based decision-making. GIS systems, ODK platforms, real-time dashboards, and digital reporting tools enhanced operational visibility and facilitated rapid response during campaign implementation.

Despite these positive outcomes, several structural challenges continue to hinder the effective institutionalisation of project management practices in Nigeria's public health system. These challenges include inconsistent PM frameworks, inadequate training of health personnel, donor dependency, fragmented information systems, weak digital infrastructure, and insecurity within conflict-prone regions.

The study therefore concludes that sustainable polio eradication efforts in Nigeria require the institutionalisation of context-sensitive and hybrid project management frameworks that balance operational structure with flexibility and adaptability. Public health agencies should prioritise continuous capacity building for EOC personnel in project management methodologies, risk management, digital systems, and adaptive leadership.

The government should also strengthen local ownership of public health interventions by integrating project management roles into existing health governance structures and reducing overdependence on external donor funding. Investments in digital infrastructure, integrated health information systems, and community-centred engagement strategies are equally essential for improving resilience and sustainability.

The study contributes significantly to the growing body of knowledge on project management in public health emergencies by providing empirical evidence from a fragile and resource-constrained setting. The findings offer valuable practical insights for policymakers, development partners, public health practitioners, and emergency response agencies seeking to strengthen disease eradication programmes and emergency health operations in Nigeria and similar contexts.

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