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AVAILABILITY AND ADEQUACY OF ESSENTIAL MEDICATIONS, EQUIPMENT, AND SUPPLIES USED IN PEDIATRIC CRITICAL CARE IN PUBLIC HOSPITALS IN SIAYA COUNTY, KENYA

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ABSTRACT

Pediatric critical care requires reliable access to essential medications, functional equipment, adequate supplies and dedicated care space. This article assessed the availability, adequacy and functionality of essential medications, equipment and supplies used in pediatric critical care in public hospitals in Siaya County, Kenya. A cross-sectional descriptive quantitative design was used. Data were collected through structured questionnaires administered to healthcare professionals and facility-level personnel in eight public health facilities. The study targeted 60 respondents, and 57 complete responses were obtained. Descriptive statistics were used to summarize Pediatric Intensive Care Unit space, availability and adequacy of equipment and supplies, functionality of equipment and availability of selected essential medicines. The findings showed that dedicated Pediatric Intensive Care Unit space was almost absent, with only one facility reporting availability of such space. Although some equipment was available, most respondents reported that it was inadequate or poorly functional. Basic medicines such as ceftriaxone, inotropes, antipyretics and oral rehydration salts were more consistently available, while specialized critical care medicines were less reliable.

Key Words: *Pediatric Critical Care, Essential Medicines, Equipment, Equipment Functionality, supplies, Pediatric Intensive Care Unit, public hospitals, Siaya County.*

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INTRODUCTION

Pediatric critical care is essential for improving child survival because it requires timely assessment, continuous monitoring, appropriate medicines, functional equipment and rapid clinical intervention. While specialized healthcare workers are important, their ability to provide safe pediatric critical care also depends on the availability and adequacy of essential medications, equipment and supplies, which are frequently limited in resource-constrained public hospital settings (Tang & Lum, 2017). In Kenya, these resource gaps remain a major concern because inadequate equipment, stock-outs and limited diagnostic support can delay treatment, increase referrals and force families to meet costs outside the public hospital system.

Essential medications, equipment and supplies are therefore central to the current capacity of public hospitals to provide pediatric critical care. These resources include oxygen delivery systems, suction machines, cardiac monitors, infusion and syringe pumps, emergency resuscitation equipment, pediatric-compatible ventilators, defibrillators, antibiotics, inotropes, anticonvulsants, analgesics and other emergency medicines. In pediatric critical care, availability alone is not enough; equipment must be functional, properly maintained, appropriate for children and accessible when needed. Similarly, medicines and supplies must be consistently stocked, affordable and usable at the point of care. Evidence from low-resource settings shows that pediatric critical care is often weakened by inadequate infrastructure, limited equipment, a shortage of essential supplies, high cost of care, and weak resource allocation systems (Olatunji et al., 2024).

The issue is broader than the physical presence of machines or medicines in a facility. Pediatric critical care capacity depends on the interaction between space, staff, systems and "stuff," meaning that essential resources must be supported by proper procurement, storage, maintenance, inventory control and clinical use systems (Bjorklund et al., 2022). A hospital may have oxygen cylinders, monitors, or pumps, but these resources may still be inadequate if they are too few, non-functional, unavailable in pediatric areas, or unsuitable for pediatric patients. This is especially important in county and rural public hospitals, where equipment shortages and delayed procurement can affect routine care, emergency care and referral decisions.

Kenyan evidence also shows that public hospitals continue to experience recurrent stock-outs of essential commodities. A recent study at Kitui County Referral Hospital found inadequate availability of tracer essential commodities across hospital departments and linked the gaps to supply chain inefficiencies, delayed deliveries, weak inventory systems and limited inventory management capacity (Kalola et al., 2025). Although the study was not limited to pediatric critical care, its findings are relevant because pediatric critical care depends on uninterrupted access to medicines, consumables, oxygen accessories, monitoring supplies and emergency equipment. When these resources are missing, healthcare workers may be available but still unable to deliver the level of care required.

The problem addressed in this article is therefore the inadequacy and inconsistent availability of essential medications, equipment and supplies used in pediatric critical care in public hospitals in Siaya County. Inadequate equipment and medicine shortages can delay assessment, stabilization, monitoring and treatment, while limited access to basic diagnostic services and long waiting lines for scans or investigations may increase the cost burden on families. In the Kenyan public health context, where many households have limited financial protection, such gaps can lead to out-of-pocket spending, delayed clinical decisions, premature referrals and avoidable pressure on higher-level facilities. Therefore, this article assesses the availability and adequacy of essential medications, equipment and supplies used in pediatric critical care in public hospitals in Siaya County, Kenya.

LITERATURE REVIEW

Empirical Review

High-quality pediatric healthcare hinges on readily accessible essential medications, equipment, and supplies. This encompasses a spectrum of resources, from basic antibiotics, inotropes, and analgesics to specialized diagnostic and therapeutic tools. This document section synthesizes existing literature on the global, regional, and Kenyan availability of these critical resources within pediatric healthcare settings. Pediatric critical care is essential for the survival of critically ill children, addressing conditions such as severe infections, traumatic injuries, and complex medical issues. However, the literature consistently reveals significant challenges in accessing vital medicines and supplies for pediatric critical care, particularly in low- and middle-income countries (LMICs) (Olatunji et al., 2024). These challenges include limited availability and supply of essential medications and equipment, high costs due to prohibitive pricing that restricts access for many families, fragile supply chains susceptible to disruptions, resulting in shortages and delays, and inadequate infrastructure that leads to deficiencies in storage facilities and transportation systems (Yenet et al., 2023).

Pediatric critical care plays a pivotal role in the survival and well-being of critically ill children, providing specialized interventions for life-threatening conditions. However, the effective delivery of this care is significantly impacted by challenges related to access to essential medications and supplies (Olatunji et al., 2024). The limited availability of critical care medications and supplies, particularly in resource-constrained settings, poses a significant obstacle. Studies have cited that this scarcity can arise from various factors, including inadequate production, inefficient distribution channels, and insufficient financial resources to procure necessary items (Adebisi et al., 2022). Furthermore, the high cost of many essential medications and supplies can create financial barriers for families, hindering access to life-saving treatments (Slusher et al., 2018).

The fragility of supply chains further exacerbates these challenges. Disruptions within these chains, whether due to natural disasters, political instability, or logistical bottlenecks, can lead to critical shortages of essential medical resources. This unpredictability in supply can severely compromise the quality and timeliness of patient care (Bednarski et al., 2023). Finally, inadequate infrastructure can significantly impede access to essential medications and supplies. Insufficient storage facilities, unreliable transportation systems, and a lack of trained personnel to manage supply chains can contribute to medication spoilage, delivery delays, and ultimately, compromised patient outcomes (Padmane et al., 2024). These multifaceted challenges underscore the urgent need for concerted efforts to improve access to essential medications and supplies in pediatric critical care. Addressing these issues requires a multi-pronged approach that involves strengthening supply chains, improving affordability, and enhancing the capacity of healthcare systems to effectively manage and distribute critical resources.

The availability and accessibility of pediatric critical care medicines and supplies in Kenya present significant challenges. While the Kenyan government has implemented various policies and programs to improve child health, including initiatives like the Kenya Essential Package for Health (KEPH), significant gaps remain (Oliwa et al., 2023). The availability of pediatric critical care units and trained personnel is limited, particularly outside major urban centers. This scarcity restricts access to specialized care for critically ill children, often resulting in delayed or inadequate treatment (Oliwa et al., 2023). Furthermore, the Kenyan healthcare system faces numerous challenges, including inadequate infrastructure, limited resources, and a shortage of skilled healthcare professionals. These factors contribute to a fragile healthcare system that struggles to consistently provide high-quality pediatric critical care (Kenya Health Federation, 2021).

The procurement and distribution of essential medicines and supplies pose significant hurdles. Supply chain disruptions, limited storage capacity, and inadequate transportation infrastructure can lead to stockouts and delays in accessing crucial medications (Adhikari et al., 2024). Moreover, the high cost of many critical care medications can be a significant financial burden for families, hindering access to life-saving treatments

(Yenet et al., 2023). Despite these challenges, there have been some notable successes. Initiatives like the Kenya Pediatric Association have played a crucial role in advocating for improved pediatric healthcare and raising awareness about the critical needs of children. Furthermore, collaborations between government agencies, non-governmental organizations, and international partners have led to advancements in pediatric care delivery.

Studies have proposed several key areas that require significant attention to further improve the situation. Strengthening the healthcare infrastructure, including the development of robust supply chains and improved transportation networks. Investing in the training and retention of pediatric critical care specialists is essential to ensure adequate human resources (Slusher et al., 2018; Padmane et al., 2024). Furthermore, exploring innovative financing mechanisms, such as drug subsidies and insurance programs, can help improve the affordability and accessibility of essential medications (Olatunji et al., 2024). By addressing these challenges and building upon existing successes, Kenya can strive to provide equitable and high-quality pediatric critical care for all children.

METHODOLOGY

This study used a cross-sectional descriptive quantitative design to assess the availability and adequacy of essential medications, equipment and supplies used in pediatric critical care in public hospitals in Siaya County. This design was suitable because it enabled the researcher to collect standardized information from several public health facilities at a single point in time and describe the existing resource capacity for pediatric critical care. The study population included facility leaders and healthcare personnel involved in pediatric service delivery, such as nurses, clinical officers, medical officers, heads of pediatric units, facility in-charges and other relevant staff working in Level 3, Level 4 and Level 5 public health facilities in Siaya County. A census approach was applied because the number of eligible facilities and key personnel involved in pediatric care within the county was limited. The study targeted 60 respondents, out of which 57 completed the questionnaire, giving a response rate of 95%. Respondents were drawn from eight public health facilities in Siaya County. The inclusion of different cadres helped to obtain information from staff who were familiar with the availability, use and adequacy of pediatric critical care resources in their respective facilities. Data were collected using a structured questionnaire administered through KoboToolbox. The tool contained closed-ended questions, Likert-scale items, multiple-choice questions and numerical response items. For this article, the analysis focused on resource-related variables, including the availability of pediatric intensive care space, oxygen supply, cardiac monitors, suction machines, infusion and feeding pumps, syringe pumps, ventilators, emergency resuscitation equipment, defibrillators, electrocardiography machines, echocardiography machines, neonatal incubators and selected essential medications. The questionnaire also captured respondents' perceptions of whether these resources were adequate for pediatric critical care service delivery. Before completing the questionnaire, respondents were informed about the purpose of the study and given guidance on how to provide their responses. Completed questionnaires were coded and securely stored to protect participant confidentiality. Data were cleaned and analyzed using statistical software. Descriptive statistics, including frequencies and percentages, were used to summarize the availability and adequacy of essential medications, equipment and supplies. Ethical approval and research authorization were obtained from the relevant regulatory bodies, including the National Commission for Science, Technology and Innovation. Participation was voluntary, informed consent was obtained, and confidentiality was maintained throughout the study.

FINDINGS

The findings are based on data collected through structured questionnaires administered to 57 healthcare professionals and facility-level personnel involved in pediatric care in public hospitals in Siaya County. The respondents were drawn from eight facilities: Ambira Sub County Hospital, Bondo Sub County Hospital,

Madiany Sub County Hospital, Pap Kodero Health Centre, Siaya County Referral Hospital, St. Elizabeth Lwak Hospital, Ukwala Sub County Hospital and Yala Sub County Hospital.

This article assessed the availability and adequacy of essential medications, equipment and supplies used in pediatric critical care in the selected public hospitals. The analysis focused on the presence of pediatric intensive care unit space, availability and functionality of key equipment, and availability of essential medicines required for pediatric emergency and critical care. The main equipment and supplies assessed included oxygen supply, cardiac monitors, suction machines, infusion and feeding pumps, syringe pumps, ventilators, emergency resuscitation equipment, defibrillators, electrocardiography machines, echocardiography machines and neonatal incubators. The medication assessment considered commonly required pediatric critical care drugs, including antibiotics, inotropes, antipyretics, oral rehydration salts, anti-arrhythmic drugs, neuroblockers, thrombolytics, antiseizure medicines and analgesics.

The study began by assessing the availability of pediatric Intensive Care Unit spaces in the health facilities in Siava County. The findings are presented in Figure 1.

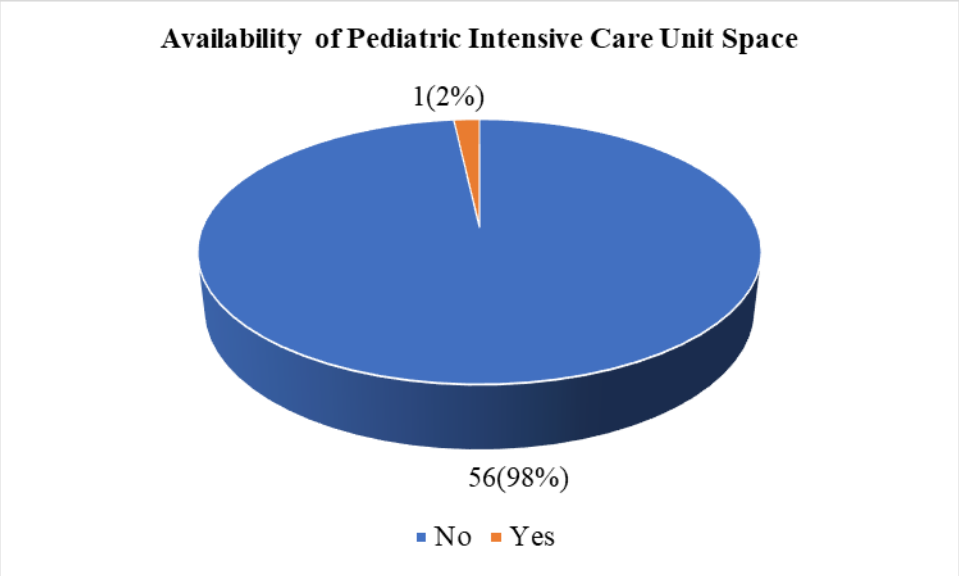

Figure 1: Availability of Pediatric Intensive Care Unit Space

Results in Figure 1 show a major gap in dedicated pediatric critical care space across the assessed public hospitals in Siaya County. Out of 57 respondents, 56 respondents, representing 98%, reported that their facilities did not have a Pediatric Intensive Care Unit, while only 1 respondent, representing 2%, reported the availability of such a unit. The only facility with a Pediatric Intensive Care Unit had a capacity of six beds, but the available space was still reported as inadequate. This indicates that dedicated pediatric critical care space is almost absent in the assessed facilities.

The implication is that most children who require advanced monitoring, emergency support, or close observation are likely to be managed within general pediatric wards, acute rooms, or other non-specialized spaces. This may limit the quality and timeliness of care because pediatric critical care requires appropriate space, functional equipment, continuous monitoring and staff who can respond quickly to clinical emergencies. The lack of dedicated Pediatric Intensive Care Unit space may also increase referrals to higher-level facilities, delay care and add costs to families, especially where transport, scans, medicines or specialized services must be obtained outside the facility.

Beyond the shortage of dedicated pediatric critical care space, the assessment also identified gaps in essential equipment and supplies. Key resources such as oxygen supply, cardiac monitors, suction machines, infusion

and feeding pumps, echocardiography machines, electrocardiography machines, defibrillators, syringe pumps, emergency resuscitation equipment and ventilators were reported as either inadequate or not available. This shows that the resource challenge was not limited to physical space, but also affected the basic tools required for monitoring, stabilization and emergency support in pediatric critical care. Therefore, realistic improvements such as designated pediatric high-dependency corners, basic monitoring equipment and phased development of pediatric critical care space may be more practical before full Pediatric Intensive Care Unit expansion.

The study then assessed availability of essential equipment and supplies. Figure 2 shows the responses by the surveyed health care workers.

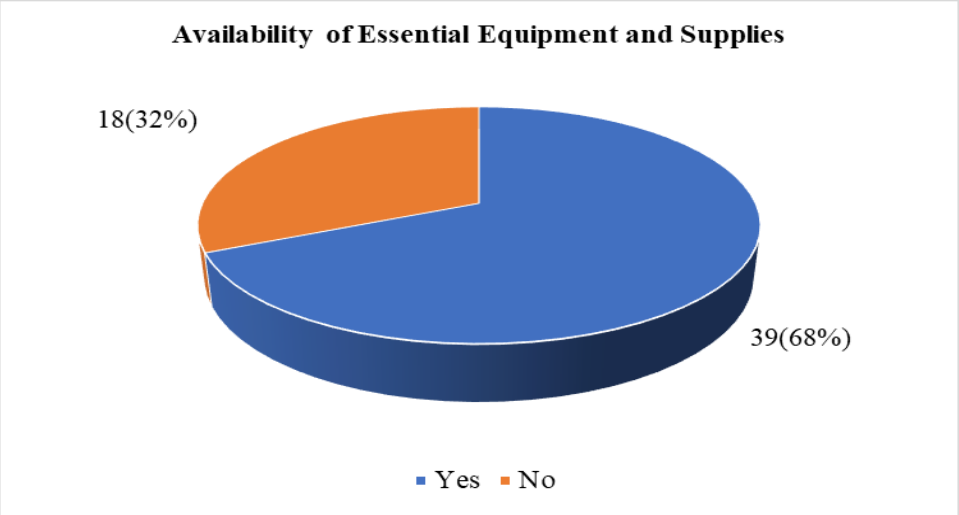

Figure 2: Availability of Essential Equipment and Supplies

Figure 3 shows whether essential equipment and supplies used in pediatric critical care were present in the assessed public hospitals. The findings indicate that 39 respondents, representing 68%, reported that the equipment and supplies were available in some form, while 18 respondents, representing 32%, reported that they were not available. This shows that although some facilities had essential equipment and supplies, almost one third lacked them completely.

The study then assessed the adequacy of the available essential equipment and supplies among the 39 respondents who reported that such resources were present in their facilities, with the results shown in Figure 3. This was necessary because availability alone does not mean that the resources are sufficient for pediatric critical care service delivery.

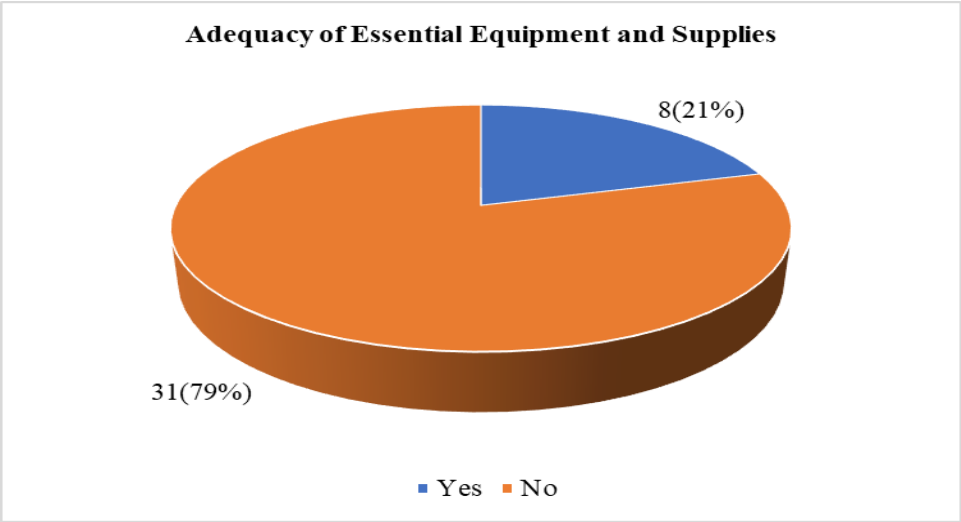

Figure 3: Adequacy of Essential Equipment and Supplies

Figure 3 presents the adequacy of essential equipment and supplies among the 39 respondents who reported that these resources were available in their facilities. The findings show that 31 respondents, representing 79%, considered the available equipment and supplies inadequate, while only 8 respondents, representing 21%, reported that they were adequate. This indicates that the presence of equipment and supplies did not necessarily translate into sufficient pediatric critical care capacity. In practical terms, most facilities had some resources, but these were not enough to meet service demands, especially where several children may require monitoring, oxygen support, emergency resuscitation or other critical care interventions at the same time. This finding highlights the need to improve not only the availability of equipment and supplies, but also their quantity and readiness for use in pediatric care areas.

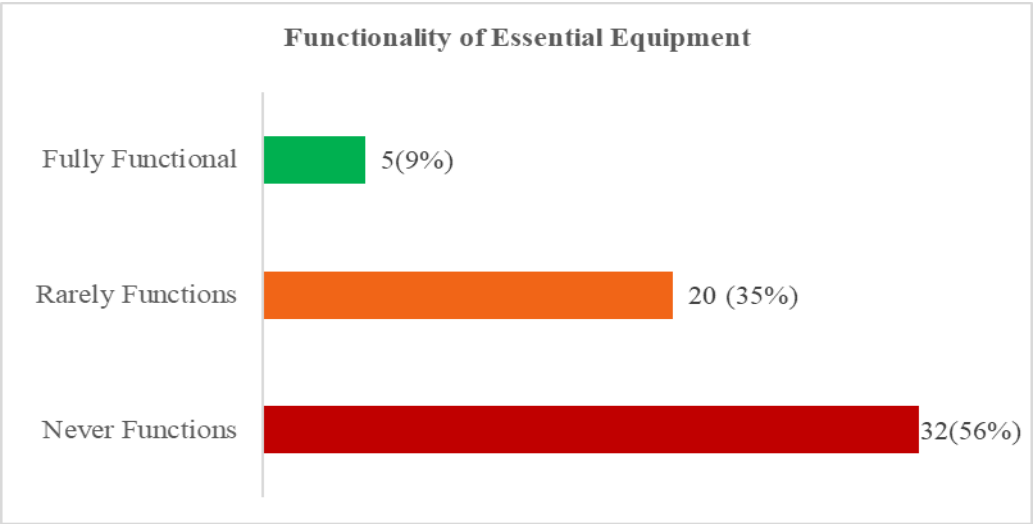

Figure 4: Functionality of Essential Equipment

Figure 4 presents the functionality of essential equipment used in pediatric critical care. The findings show that 32 respondents, representing 56%, reported that the equipment never functions, while 20 respondents, representing 35%, reported that it rarely functions. Only 5 respondents, representing 9%, reported that the equipment was fully functional. This indicates that the equipment challenge was not only about availability and adequacy, but also reliability. Even where equipment was present, it was often not dependable for routine pediatric critical care use. This may delay monitoring, stabilization, emergency response and referral

preparation, especially in facilities where children depend on limited equipment such as oxygen systems, suction machines, cardiac monitors, infusion pumps, ventilators and emergency resuscitation tools.

The assessment also considered the availability of selected essential medications used in pediatric critical care. In contrast to the major gaps reported in equipment and supplies, some basic medicines were more consistently available across the assessed facilities. Drugs such as ceftriaxone, inotropes, antipyretics and oral rehydration salts were generally reported to be available. However, more specialized medicines used in pediatric critical care, including anti-arrhythmic drugs, neuroblockers, thrombolytics, antiseizure medicines and analgesics, were less reliably available, with some respondents reporting that they were rarely available or not available at all. This suggests that public hospitals in Siaya County may have better access to common pediatric medicines than to specialized medications required for advanced pediatric critical care.

DISCUSSION

Availability of Dedicated Pediatric Critical Care Space

The study found that dedicated Pediatric Intensive Care Unit (PICU) space was almost entirely absent across the eight assessed facilities, with only one facility (Siaya County Referral Hospital) reporting a PICU with a capacity of six beds, which was still reported as inadequate. This finding aligns with the broader Kenyan context where specialized pediatric critical care infrastructure remains severely limited, particularly outside major urban centers.

Recent evidence from Moi Teaching and Referral Hospital (MTRH) in western Kenya illustrates this challenge vividly. Despite having a dedicated physical space constructed for a 12-bed PICU, the unit remains non-operational due to staffing shortages, equipment gaps, and system development needs. Dr. Joram Nyandat, the only pediatric intensivist in western Kenya, reports receiving three to four requests for a PICU bed daily, with most children unable to access one (AMPATH Kenya, 2025). This situation mirrors the findings in Siaya, where critically ill children are likely managed in general pediatric wards, acute rooms, or adult ICUs—environments not designed for pediatric physiological needs.

The national picture shows some progress, with Lamu County recently launching its first ICU facility at King Fahd Hospital, which includes three adult and two pediatric beds (Ochieng, A., 2025). However, this represents a single unit serving an entire county, highlighting how sparse such resources remain nationally. The absence of dedicated PICU space in Siaya is therefore not an isolated problem but reflects a systemic gap in Kenya's pediatric critical care infrastructure.

Availability of Essential Equipment and Supplies

The findings revealed severe deficiencies in essential equipment across Siaya County's public hospitals. Ventilators were unavailable in 61.4% of facilities, defibrillators in 68.4%, ECG machines in 68.4%, and ECHO machines in 75.4%. Even where equipment existed, functionality was poor, with 56% of respondents reporting that equipment never functions and 35% reporting it rarely functions. Only 9% of respondents reported fully functional equipment.

These findings are consistent with national evidence from the Kitui County Referral Hospital study, which assessed availability of 155 tracer essential commodities across 22 departments. That study found that only 2 of 22 departments (9.1%) met the WHO-recommended 80% availability threshold for essential commodities. The intensive care unit (ICU) at Kitui recorded only 73% availability, with frequent stock-outs of critical items such as pediatric electrodes and syringes. The non-pharmaceutical store recorded the lowest availability at 29%, affecting supplies essential for pediatric procedures.

The functionality gap identified in Siaya—where equipment exists but is non-functional—represents a distinct challenge beyond mere availability. This aligns with findings from the Kitui study, where qualitative interviews revealed that staff rotations without adequate handovers, inconsistent supervision, and poor

interdepartmental coordination contributed to weak inventory control and equipment maintenance failures. The absence of structured leadership oversight in enforcing maintenance protocols compounded these challenges.

A national health assessment report released by Health Cabinet Secretary Aden Duale further contextualizes these findings, revealing that all 23 essential tracer medicines experienced stock-outs in the week prior to assessment (Business Daily., 2025). While this report focused on medicines, the systemic supply chain weaknesses it identified—including procurement inefficiencies and weak inventory systems—directly affect equipment availability as well.

Functionality of Equipment as a Systemic Failure

The finding that only 9% of respondents reported fully functional equipment warrants deeper analysis. This is not merely a technical issue but reflects systemic governance and operational failures. The Kitui County study identified several human resource and organizational factors associated with commodity availability that explain this functionality gap:

Human Resource Factors: Departments led by staff who had received specialized training in inventory or commodity management demonstrated significantly higher availability ($p = 0.029$). However, only 22.7% of departmental in-charges had such targeted training. Other significant factors included routine supervisory visits ($p = 0.026$), longer staff experience exceeding five years ($p = 0.024$), and low staff turnover ($p = 0.026$).

Procurement and Supply Chain Factors: The Kitui study revealed that the Kenya Medical Supplies Authority (KEMSA) fulfilled only 51-60% of the hospital's requested orders during the assessment period, with departments experiencing 2–3-week lead times, especially during weekends, holidays, and quarter-end. This procurement inefficiency directly affects equipment availability, as spare parts and replacement equipment face the same supply chain bottlenecks as medicines.

Financial Constraints: At the national level, KEMSA is grappling with a severe financial crisis, with the Ministry of Health requesting Sh5 billion from the National Treasury to address stock shortages. The agency's stock of essential health products currently stands at 56%, well below optimal levels, with outstanding debts amounting to Sh6.1 billion, including Sh3.5 billion owed by county governments. As of the second quarter of the 2024/25 financial year, availability of essential medical supplies had dropped to 45%, far below the 90% target.

ICT Infrastructure Gaps: A study on ICT infrastructure support for essential medicine supply chain management in Kajiado, Makueni, and Mombasa counties found that most public hospitals lack sufficient functional computers to support digital information processing for supply chain management. Even where electricity connectivity exists, reliable internet to support inter-computer connectivity and timely digital information communication is often absent. This digital gap directly impairs the ability to track equipment functionality, schedule maintenance, and order spare parts in a timely manner.

Availability of Essential Medications

The study found a dichotomy in medicine availability: basic medicines such as ceftriaxone (56.1% always available), inotropes (64.9% always available), antipyretics (57.9%), and oral rehydration salts (66.7%) were more consistently available. However, specialized critical care medicines—anti-arrhythmics (only 14% always available), neuroblockers (15.8%), thrombolytics (14%), and strong analgesics (45.6%)—were much less reliable.

This pattern is consistent with national findings. The national health assessment report revealed that Magnesium Sulphate (48% stock-out), Benzyl Penicillin (47% stock-out), and Oxytocin injection (40% stock-out)—all essential for managing maternal and neonatal complications—were among the most affected medicines. The Kitui County study similarly found that pediatric antibiotics such as amoxicillin syrup were

frequently out of stock in outpatient departments, and pediatric electrodes were among the most frequently unavailable items in the ICU.

The selective availability pattern reflects several underlying factors. First, supply chains prioritize high-volume, low-cost items that serve broader populations over specialized critical care drugs with lower turnover. Second, forecasting systems often fail to account for the specific needs of pediatric critical care, where smaller dosages, specific formulations, and less common drugs are required. Third, as noted in the Kitui study, departments that employed consumption-based forecasting methods showed significantly better commodity availability ($p = 0.021$), suggesting that improved forecasting could address some of these gaps.

Referral Systems and Medicine Availability

The study found that 88% of facilities had formal referral protocols, and most transfers occurred within three hours. However, the availability of essential medicines at referring facilities directly impacts referral quality. When a child is transferred without receiving stabilizing medications (e.g., anticonvulsants for status epilepticus or vasopressors for septic shock), their condition may deteriorate during transport, reducing the chances of survival even if the receiving facility has better resources.

The Kitui study's finding that only two departments met the WHO 80% availability threshold suggests that referring facilities in Siaya likely face similar challenges, potentially compromising pre-referral stabilization. This creates a dangerous cascade: the absence of specialized medicines at lower-level facilities leads to unstable transfers, which increase mortality risk even when higher-level care is available.

Comparison with National Efforts and Policy Context

Several national initiatives aim to address these gaps, though their impact at the county level remains limited. The Ministry of Health and KEMSA are partnering with County Pharmacists to improve demand forecasting and procurement planning, emphasizing the need for real-time, county-level data to build a reliable supply chain. However, the implementation of these initiatives faces significant barriers, including the financial crisis at KEMSA and the ICT infrastructure gaps documented across multiple counties. Kihika, S. (2025)

Nakuru County recently flagged off medical supplies worth Kshs 21 million for distribution to 216 public health facilities, with non-pharmaceutical supplies worth Kshs 30 million also delivered. (The Standard. 2023). This demonstrates that some counties are making progress, but such efforts remain uneven, and Siaya County's situation may reflect broader challenges in counties with fewer resources or weaker supply chain systems.

CONCLUSION

The study concludes that public hospitals in Siaya County have major gaps in the availability, adequacy and functionality of essential medications, equipment and supplies used in pediatric critical care. Dedicated Pediatric Intensive Care Unit space is almost entirely absent. Even where equipment exists, it is predominantly non-functional or poorly functional due to systemic maintenance failures, weak inventory management, and procurement inefficiencies. Basic medicines are more consistently available, but specialized critical care drugs required for managing complex pediatric emergencies are rarely available. These gaps limit timely monitoring, stabilization and treatment, while increasing referrals and costs for families. Strengthening pediatric critical care therefore requires phased, affordable improvements in space, equipment, maintenance and essential supplies.

These findings are consistent with national evidence from Kitui County, MTRH, and national health assessments, which document that only a small fraction of Kenyan health departments meet WHO availability thresholds, supply chains are fragile, and human resource capacity for inventory management is severely limited. The financial crisis at KEMSA and ICT infrastructure gaps further compound these challenges

RECOMMENDATIONS

At county and policy level, Siaya County should strengthen pediatric critical care resources through low-cost digital and telemedicine-supported systems that are realistic within Kenya's public health setting. In addition, they should Conduct a complete equipment functionality audit across all eight facilities, documenting every piece of critical equipment (ventilators, monitors, suction machines, infusion pumps, defibrillators) with status: functional, repairable, or beyond repair. The Ministry of Health, county health department and hospital managers should improve electronic tracking of essential medicines, equipment and supplies through simple digital inventory systems that can show stock levels, expiry dates, equipment breakdowns and urgent gaps across facilities. This would help reduce stock-outs, delayed procurement and poor distribution of resources. Telemedicine links should also be developed between lower-level public hospitals in Siaya County and higher-level referral facilities so that healthcare workers can receive timely specialist guidance before referral, especially where Pediatric Intensive Care Unit space, scans or specialized equipment are not available locally.

At facility level, hospitals should use create a daily equipment checklist, establish critical drugs list for pediatric emergencies, implement a minimum stock level for each critical pediatric drug, create a referral stabilization pack containing essential emergency drugs and equipment for every child transferred and a practical technology-based approaches to improve the use and maintenance of available resources. Each facility should maintain a digital equipment register showing whether oxygen systems, monitors, suction machines, infusion pumps, ventilators, and emergency equipment are available, functional, or awaiting repair. Basic mobile-based reporting, phone consultation, WhatsApp clinical coordination groups and scheduled virtual mentorship sessions can support faster decision-making without requiring expensive infrastructure. Telemedicine should not replace physical equipment or essential medicines, but it can help facilities use limited resources better, identify patients who need urgent referral, reduce unnecessary delays and support staff in managing pediatric emergencies while awaiting transfer. These measures would be more affordable than immediately establishing full Pediatric Intensive Care Units in every facility.

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