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Review Article

The discontinuation of halothane production and its implications for anaesthesia practice in resource-limited countries: a Nigerian perspective

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ABSTRACT

Halothane has long been a cornerstone of anaesthesia in low- and middle-income countries, (LMICs) including Nigeria, owing to its low cost, effectiveness, and compatibility with basic delivery systems such as draw-over apparatus. However, its declining global production, driven by commercial decisions in high-income markets, threatens the sustainability of anaesthesia in resource-limited settings. This review examines the implications of reduced availability of halothane for Nigerian anaesthesia practice and explores strategies to maintain safe perioperative care. A narrative review of the literature from PubMed, Google Scholar, and SciSpace was conducted, focused on halothane use, volatile agents, workforce capacity, and service delivery in Nigerian and LMICs healthcare contexts. The diminishing supply of halothane poses major challenges for rural and under-resourced facilities that rely on it for routine surgery, reflecting deeper systemic problems including inadequate healthcare funding, infrastructure gaps, workforce shortages, and reliance on imported medical supplies. Transitioning to alternatives such as isoflurane or sevoflurane offers safety advantages but entails higher costs, greater equipment requirements, increased training needs, and the potential widening existing disparities in access to safe anaesthesia. The cessation of halothane production poses both a challenge and an opportunity for anaesthesia practice in Nigeria. Strategic investments in workforce training, infrastructure, affordable alternative techniques, and supportive national policies are essential to ensure a sustainable transition and to preserve equitable, high-quality perioperative care.

Keywords: Halothane, Nigeria, Low- and middle-income countries, Volatile anaesthetic agents, Surgical equity

INTRODUCTION

Access to safe surgical and anaesthesia care constitutes an essential component of universal health coverage (UHC) and serves as a pivotal determinant of health outcomes across diverse populations.[1] Nevertheless, for several decades, millions of patients in low-and middle-income countries (LMICs) have depended on a limited number of affordable anaesthetic agents, among which halothane has occupied a prominent position. Introduced into clinical practice in 1956 by Suckling and colleagues, halothane swiftly attained global acceptance as a safe, potent, and readily administered volatile anaesthetic agent.[2] Its non-inflammability, pleasant non-pungent odour, and rapid induction makes it suitable for inhalational anaesthetic induction, particularly in paediatric patients. Its compatibility with non-electrical draw-over delivery systems rendered it exceptionally adapted to the operational realities of general hospitals and rural healthcare facilities across sub-Saharan Africa and other resource-constrained regions.[3]

While high-income countries (HICs) progressively moved towards newer halogenated agents such as isoflurane, sevoflurane and desflurane from the 1980s onward, driven by concerns regarding halothane-associated hepatotoxicity and cardiac arrhythmias, halothane remained the cornerstone of inhalational

anaesthesia in several LMICs well into the 21st century.[4] This persistence should not be interpreted as clinical resistance but rather as a pragmatic response to the economic realities and infrastructural deficiencies of healthcare delivery in these contexts.

The recent decision by leading pharmaceutical manufacturers to terminate halothane production has consequently engendered a significant and far-reaching challenge for anaesthesia practice in resource-limited countries. Nigeria, being Africa's most populous country, with a population of over 220 million and a healthcare system characterized by persistent underfunding, migration of healthcare workers, worsening the already depleted critical workforce and pronounced geographic disparities serve as a salient example of the multifaceted vulnerabilities exposed by this transition.[5] The impact extends well beyond the operating theatre, affecting surgical accessibility, paediatric care, healthcare financing, workforce development, and the overarching trajectory of health systems strengthening.

This review sought to: provide a comprehensive account of halothane's historical and clinical significance in the practice of anaesthesia within Nigeria and sub-Saharan Africa; critically evaluate the pharmacological justifications underlying its discontinuation; examine the clinical, socioeconomic, and public health consequences of its withdrawal; assess available alternatives; and propose evidence-based, context-sensitive strategies for navigating this transition in an equitable and safe manner.

HALOTHANE: HISTORICAL ROLE AND CLINICAL PROFILE IN RESOURCE-LIMITED SETTINGS

Introduction and global adoption

Halothane (2-bromo-2-chloro-1,1,1-trifluoroethane) was first synthesized by Charles Suckling at Imperial Chemical Industries in 1951 and subsequently introduced into clinical anaesthesia in 1956.[2]

It rapidly became the predominant and preferred volatile anaesthetic agent, displacing diethyl ether and chloroform, attributable to its superior safety profile, greater potency (minimum alveolar concentration [MAC] of 0.75% in adult populations), and its non-flammability, a significant advantage during the period of open ether anaesthesia.[3] Its pleasant, sweet-smelling odour facilitated a smooth and cooperative inhalational induction, particularly in paediatric patients who resist intravenous cannulation.[7]

Unique suitability for resource-limited settings

The use of Halothane in LMICs was supported by several context-specific benefits that contemporary agents could not easily replicate:

Affordability

Halothane was markedly less expensive than isoflurane, sevoflurane, and desflurane, rendering it accessible to public hospitals and mission facilities operating under financial constraints. In several Nigerian states, halothane is the sole economically feasible inhalational agent available.[6]

Compatibility with draw-over systems

In contrast to modern volatile anaesthetic agents that require calibrated, agent-specific, pressurized vaporizers and advanced anaesthetic workstations, halothane could be effectively administered using simple draw-over vaporizers (e.g., the Oxford Miniature Vaporizer, EMO vaporizer) that operate independently of compressed gas or electrical power.[3] This feature was essential for rural and local hospitals associated with unreliable public power supply and limited medical gas infrastructure.

Paediatric inhalational induction

The non-irritating aroma and smooth induction properties of halothane made it the preferred agent for mask induction in pediatric patients, a technique of particular significance in settings where intravenous access in children may be challenging and where topical anaesthetic creams are unavailable.[2,8]

Provider familiarity

Multiple generations of Nigerian anaesthetists were trained using halothane-based systems. This institutional familiarity reduced the risk of dosing errors and equipment misuse in environments with restricted opportunities for the continuing professional development.[6]

Prevalence of Halothane use in Sub-Saharan Africa

The continuous use of halothane within the sub-Saharan Africa has been extensively documented. A survey of paediatric anaesthesia services across French-speaking sub-Saharan Africa indicated that, despite a decline, the availability of halothane persisted at 50.4% among the surveyed institutions in 2022, a significant decrease from 81.5% in 2012.[8]

This trend signifies a gradual yet incomplete transition towards the adoption of newer volatile agents, as evidenced by the increase in sevoflurane availability from 5% to 36.2% during the same decade. Nonetheless, this figure remains substantially below universal access.[8]

In Nigeria, studies examining anaesthetic practices have consistently showed a continued dependence on halothane, especially within public-sector hospitals, local health facilities, and mission-based healthcare institutions.[6]

PHARMACOLOGICAL BASIS FOR HALOTHANE'S DISCONTINUATION

Hepatotoxicity

One of the most significant adverse effects necessitating the substitution of halothane is hepatotoxicity, which is seen in two distinct patterns:

Type I (Mild) hepatotoxicity

This variant, occurring in approximately 20-30% of patients exposed to halothane, presents as mild, self-limiting elevation of serum transaminases. It is believed to arise from the reductive metabolism of halothane under hypoxic conditions, leading to the formation of reactive intermediates that induce centrilobular necrosis.[4] The effects of Type I hepatotoxicity are typically minimal, and resolution is generally spontaneous.

Type II (Severe) hepatotoxicity-halothane hepatitis

This is a rare but potentially fatal complication occurring in approximately 1 in 10,000 adult exposures (and is even rarer in pediatric populations). It is mediated through an immune mechanism whereby the oxidative metabolism of halothane produces trifluoroacetyl (TFA) halide, which subsequently binds to hepatic proteins, thereby generating neoantigens that activate a CD4+ T-cell-mediated autoimmune hepatitis.[4] The likelihood of this condition increases with repeated exposures, particularly when the sensitization interval between administrations is six weeks or less and significantly elevating the associated risk. Mortality rates from fulminant halothane hepatitis have been reported to range from 14% to 70%.[4]

The incidence of halothane hepatitis is higher in adults compared to children (estimated at 1:82,000 in pediatric cases versus a range of 1:7,000–1:30,000 in adults), and following repeated exposures.[2,4] This differential risk profile in pediatric populations partly explains the prolonged utilization of halothane in pediatric anesthesia practices on a global scale.[2]

Cardiovascular effects

Halothane has cardiodepressant effects, including a reduction in myocardial contractility, diminished cardiac output, and a decrease in systemic vascular resistance, resulting in a dose-dependent decline in arterial blood pressure.[2] Of particular clinical concern is halothane's sensitization of the myocardium to catecholamine-induced arrhythmias, a phenomenon mediated through the reduction of atrioventricular conduction, and augmented automaticity. This effect is further exacerbated by hypercapnia, administration of exogenous adrenaline, and the use of sympathomimetic agents, increasing the risk of potentially fatal ventricular arrhythmias in susceptible individuals.[2,3]

Other adverse effects

Additionally, the pharmacological considerations include halothane-induced uterine relaxation (limiting its use in obstetric haemorrhage), the potential for triggering malignant hyperthermia (a risk shared with all halogenated agents), and environmental concerns associated with its ozone-depleting potential, although the latter is significantly lower in comparison to that of desflurane.[3]

The risk-benefit equation in LMICs

It is imperative to contextualize the risk profile associated with halothane within the operational realities of LMICs anaesthesia practice. The absolute risk of severe halothane hepatitis is low, particularly within pediatric populations. In circumstances where the alternative is the absence of anaesthesia or the provision of unsafe anaesthesia which poses a substantially greater morbidity and mortality risk than of halothane hepatitis, the historical risk-benefit analysis has been favourable.[4] More recently introduced halogenated agents (isoflurane, sevoflurane, desflurane) exhibit significantly reduced hepatic metabolism (0.2%, 2-5%, and 0.02% respectively, compared to 20-40% for halothane), thereby conferring considerably lower hepatotoxic potential, but at a markedly higher financial cost and with increased infrastructural demands.[3,4]

THE SOCIOECONOMIC LANDSCAPE: POVERTY, HEALTHCARE INEQUITY, AND SURGICAL ACCESS IN NIGERIA

Healthcare financing and out-of-pocket expenditure

The healthcare system in Nigeria is characterised by chronic underfunding relative to need, with public expenditure consistently falling short of the 15% of national budget threshold recommended by the Abuja Declaration of 2001. A significant proportion of healthcare financing is borne by patients and their families through out-of-pocket expenditures, which accounts for approximately 70-77% of total health expenditure according to some estimates.[5] The enrolment in the National Health Insurance Scheme remains extremely low, with fewer than 5% of Nigerians covered by the programme.[15] Consequently, affordability of healthcare constitute a critical determinant of access to surgical care, and any increase in costs along the surgical pathway including anaesthesia, poses a huge financial burden for patients and their families.

It is estimated that only approximately 36% of Nigerians possess the financial means to access essential surgical care without facing huge expenditures.[15] The vast majority - predominantly the rural poor, women, children, and marginalized communities continue to be vulnerable to delays in accessing necessary surgical care in the face of rising costs.

The burden of unmet surgical need

Nigeria bears a significant and wide-ranging unmet need for surgical care, including conditions such as obstetric emergencies, trauma, hernia, appendicitis and congenital anomalies. According to the Lancet Commission on Global Surgery, approximately 5 billion people across the world do not have access to safe and affordable surgical and anaesthesia services when needed with the most severe shortages found in sub-Saharan Africa and South Asia.[1] Nigeria represents a major contributor to this global challenge, with a surgical workforce density and surgical output far below recommended thresholds.[13,15]

The national surgical, obstetric, anaesthesia and nursing plan (NSOANP)

Nigeria developed a National Surgical, Obstetrics, Anaesthesia and Nursing Plan (NSOANP) to address critical gaps in surgical care delivery and to improve access to safe and affordable surgical, obstetric and anaesthesia services with the attainment of UHC.[13] The NSOANP proposed the development of workforce training, surgical registries, improved operating room capacity and standardizing equipment and sterile supply management across health facilities thereby providing a strategic framework within which the response to halothane discontinuation can be addressed.[13] Nevertheless, the pace of implementation has been hindered by financial constraints, competing health system priorities and the inherent challenges of coordinating actions across a federal structure comprising 36 states and the federal capital territory.

CLINICAL CONSEQUENCES OF HALOTHANE DISCONTINUATION

Increased cost of anaesthesia and surgical care

A direct consequence of halothane discontinuation is the escalation of anaesthesia costs. Isoflurane, one of the commonly available alternatives is substantially more expensive than halothane on a per-case basis. Sevoflurane is pharmacologically superior for inhalational induction and widely preferred for paediatric anaesthesia; however, it is considerably more costly and requires agent-specific and precision vaporizers that are incompatible with the draw-over systems on which many Nigerian hospitals depend.[3,6]

The economic implications are compounded by the need for complementary infrastructure investments: anaesthetic workstations with integrated vaporizers, agent monitoring systems, scavenging systems and reliable piped medical gas supply. These capital requirements represent significant financial barriers for government and mission hospitals that largely operate on fixed and often inadequate budgets.[6] In a system where many patients already face a substantial out-of-pocket expenditure, any increase in anaesthesia costs risks further reducing access to essential surgical care.

Reduced access to safe paediatric anaesthesia

The paediatric age-group is one of the most vulnerable populations affected by halothane discontinuation. The pharmacological properties that made halothane uniquely valuable in paediatric practice- its non-pungent odour, smooth inhalational induction, and low incidence of airway irritation cannot be replaced with isoflurane. Isoflurane is highly pungent, airway-irritant and is associated with breath-holding and laryngospasm during inhalational induction.[2,8] Sevoflurane is pharmacologically superior to isoflurane for paediatric inhalational induction; however, it is highly expensive for many Nigerian centres and requires modern agent-specific vaporizers.[8,12] Data from sub-Saharan Africa indicate that sevoflurane availability in paediatric anaesthesia remains far below that observed in advanced regions of the world, there is near-absence of specialised paediatric anaesthesia training in most countries across the region, a finding directly applicable to the Nigerian context.[8] The practical consequence is increased reliance on intravenous induction techniques in children using ketamine and propofol-based regimens. While these approaches are clinically effective, they require reliable intravenous access, which may be challenging in young children particularly in the circumstances of dehydration, malnutrition or difficult anatomy. Intravenous induction also demands adequate monitoring equipment and provider competency that may not be uniformly available across healthcare facilities in Nigeria.[9,10]

Widening urban-rural healthcare disparities

The comparative capacity of urban tertiary health facilities and rural hospitals to absorb the costs and infrastructural demands of transitioning to alternative volatile anaesthetic agents, risks widening the already substantial urban-rural divide in surgical access in Nigeria. Tertiary health facilities with better funding and more specialised staff are likely to successfully transition to sevoflurane or isoflurane-based practice. Rural hospitals; however, may experience outright shortages of inhalational anaesthetic agents, thereby necessitating the cancellation of elective surgical procedures and referral of semi-urgent cases.[9]

This disparity has been documented: surveys of anaesthetic practice in rural Nigerian hospitals reported high rates of improvisation, use of expired drugs, and reliance on ketamine as the sole anaesthetic agent in facilities without functional volatile anaesthetic agent delivery systems.[6,9]

The discontinuation of halothane without concurrent investment in rural anaesthesia infrastructure risks further widening these disparities and concentrating surgical capacity in urban centres.

Increased dependence on ketamine-based and total intravenous anaesthesia TIVA

Ketamine is a phencyclidine-derivative dissociative anaesthetic agent that has historically been an essential anaesthetic agent in resource-limited settings, providing reliable surgical anaesthesia without the need for volatile anaesthetic agent delivery systems, complex monitoring or uninterrupted oxygen supply.[9,10] Its distinctive pharmacological profile-including bronchodilatory effects, preservation of airway reflexes and sympathomimetic cardiovascular effects, makes it especially useful in settings with limited monitoring and haemodynamically compromised patients.[10] Surveys from rural Nigerian surgical outreach programmes demonstrate that ketamine-based anaesthesia can safely support a wide range of general surgical, orthopaedic and paediatric procedures in the absence of volatile agents.[9] The combination of ketamine with midazolam, diazepam or propofol can mitigate emergence phenomena and improve patient experience.[10] Propofol-based TIVA offers a superior haemodynamic control and faster emergence than ketamine. It requires cold chain storage, reliable intravenous access and more sophisticated monitoring. Thus, limiting its applicability in the most resource-constrained settings.[10]

The discontinuation of halothane in clinical practice has led to an increase in the utilization of ketamine-based total intravenous anaesthesia (TIVA), which is likely to become the predominant anaesthetic technique in many Nigerian hospitals lacking the infrastructure for modern volatile anaesthetic agent delivery. While ketamine TIVA is safe and effective for a wide range of surgical procedures, it is not universally applicable: it may be unsuitable for procedures requiring complete muscle relaxation. Ketamine is associated with emergence phenomena such as dysphoria and hallucinations that may be distressing in adult patients without benzodiazepine co-administration and may not provide optimal surgical conditions for certain abdominal and thoracic procedures.[9,10]

Furthermore, the transition to ketamine-based TIVA requires provider competency in TIVA techniques, including understanding of pharmacokinetic properties and management of TIVA-specific complications that may not be uniformly present among Nigerian anaesthesia providers trained predominantly in volatile agent-based practice.[9]

Regional anaesthesia

Regional anaesthetic techniques including spinal, epidural, peripheral nerve blocks and wound infiltration offer an alternative to the use of volatile-agent for a wide range of surgical procedures. Spinal anaesthesia was the primary technique for adult patients in 68.8% of cases, in most facilities across Nigeria, reflecting its safety, efficacy and low cost.[9] Obstetrician-administered spinal anaesthesia for emergency caesarean section has been shown to reduce decision-to-delivery intervals and improve maternal and neonatal outcomes in settings where anaesthetists are unavailable.[11]

The expansion of regional anaesthesia services in Nigeria including the development of ultrasound-guided peripheral nerve block programmes is a strategically important response to halothane discontinuation and reducing dependence on volatile agents for a significant proportion of the surgical caseload.[9,11] However, regional anaesthesia is not universally applicable and many surgical procedures particularly in paediatric patients, emergency laparotomy and complex trauma continue to require general anaesthesia.

ANAESTHESIA WORKFORCE TRAINING AND CAPACITY GAPS

The transition away from halothane use in modern clinical practice exposes significant gaps in anaesthesia workforce training and continuing professional development in Nigeria. The Nigerian anaesthesia workforce comprises physician anaesthetists (trained at the level of the West African College of Surgeons Fellowship or the National Postgraduate Medical College of Nigeria fellowship) and nurse anaesthetists (trained at diploma or degree level) with physician anaesthetists density far below WHO-recommended thresholds.[8,13]

Many anaesthesia providers received their foundational training using halothane-based systems and may have limited familiarity with the pharmacology, equipment requirements, and clinical properties of isoflurane, sevoflurane or modern TIVA techniques and advanced regional anaesthesia techniques. Retraining requires structured educational programmes covering the pharmacology of volatile agents, low-flow anaesthesia principles, modern vaporizer operation, agent monitoring, and TIVA pharmacokinetics resources that are not uniformly available across Nigerian training institutions.[13]

The absence of specialised paediatric anaesthesia training programmes in most sub-Saharan African countries represents a particularly concerning gap, especially in context of halothane discontinuation and given the disproportionate impact on paediatric surgical care.[8]

POTENTIAL POSITIVE OUTCOMES OF THE TRANSITION

While the challenges posed by halothane discontinuation are substantial, the transition also presents a catalytic opportunity for systemic improvement in Nigerian anaesthesia practice. The crisis created by the discontinuation of halothane may accelerate:

Adoption of safer volatile agents with lower hepatotoxic potential, thereby reducing the burden of anaesthesia-

related liver injury. Improvement in perioperative monitoring standards, as the administration of modern volatile agents necessitates agent monitoring, capnography and pulse oximetry standards that should be universal but have historically been inconsistently applied. Expansion of training in modern anaesthesia techniques, including low-flow anaesthesia, TIVA pharmacokinetics and ultrasound-guided regional anaesthesia. Greater investment in anaesthesia infrastructure driven by the necessity of equipping facilities for alternative agent delivery. The development and implementation of national anaesthesia policies that prioritise equitable access to safe surgery and essential anaesthetic medications within the NSOANP framework.[13] Strengthening of supply chain resilience through diversification of procurement sources, development of local pharmaceutical manufacturing capacity and establishment of strategic drug reserves.

The realisation of these positive outcomes is dependent on deliberate, adequately funded and coordinated action by governments, healthcare institutions, professional bodies and international partners.

EVIDENCE-BASED STRATEGIES FOR MITIGATION

Government subsidisation of essential anaesthetic drugs

The Nigerian Federal and State Governments should classify isoflurane and sevoflurane as essential medicines and implement targeted subsidisation programmes to reduce their cost to levels accessible to public hospitals. Procurement through bulk purchasing agreements could substantially reduce unit costs. The Essential Medicines List should be updated to reflect the post-halothane anaesthetic landscape and mechanisms for consistent uninterrupted supply should be established.[5]

Strengthening anaesthesia infrastructure

The investment in anaesthesia service is a prerequisite for safe transition to alternative volatile agents. Priority investments should include: (i) Procurement and maintenance of agent-specific vaporizers compatible with isoflurane and sevoflurane. (ii) Installation of reliable piped oxygen systems or oxygen concentrators in general and rural hospitals. (iii) Provision of minimum monitoring standards (pulse oximetry, non-invasive blood pressure and capnography) at all surgical facilities. (iv) Establishment of biomedical engineering capacity for regular equipment maintenance and repair

Workforce training and capacity building

A structured national programme of continuing professional development for anaesthesia providers should be developed and implemented, covering: Pharmacology of isoflurane, sevoflurane and TIVA agents. Low-flow anaesthesia principles and environmental considerations. Paediatric anaesthesia with modern volatile agents. Ultrasound-guided regional anaesthesia. Simulation-based training for emergency scenarios.

Partnerships with international institutions for training similar to models demonstrated in Nepal and other LMICs can supplement capacity and accelerate skills transfer.[14]

Promotion and expansion of regional anaesthesia

Professional organizations such as the Nigeria Society of Anaesthetists, the umbrella body for all anaesthetist in Nigeria should formulate guidelines to facilitate the broader application of regional anaesthesia techniques, encompassing spinal anaesthesia, epidural anaesthesia and peripheral nerve blocks. Instruction in ultrasound-guided nerve blocks should be integrated into anaesthesia residency curricula as well as continuing medical development programmes.

Development and implementation of national anaesthesia policies

The NSOANP provides a strategic framework for action, but its implementation requires: Dedicated funding sources for anaesthesia infrastructure and drug procurement. Accountability mechanisms for monitoring progress against defined targets. Integration of anaesthesia quality indicators into the national health management information systems. Engagement of state governments and local government health authorities in decentralised implementation.[13]

International collaboration and advocacy

The partnerships with the World Federation of Societies of Anaesthesiologists (WFSA), the World Health Organization (WHO), Médecins Sans Frontières and other international organizations can provide technical assistance, equipment donations, training support and advocacy for the inclusion of essential anaesthetic medicines in global health financing mechanisms. The Anaesthesia community in Nigeria should actively engage global surgery advocacy platforms to ensure that the consequences of halothane discontinuation receive appropriate international attention and resource mobilization.[13]

DISCUSSION

The discontinuation of halothane production constitutes a paradigmatic example of how decisions made by the global pharmaceutical supply chain driven primarily by the preferences and regulatory requirements of high-income markets can have profound and disproportionate consequences for healthcare delivery in LMICs. The discontinuation in the production of halothane was not driven by evidence of unacceptable harm in the populations that relied upon it most, but by the

commercial logic of manufacturers responding to declining demand in high-income markets where safer, more profitable alternatives had long been established.[4,5]

This dynamic reflects a broader pattern of pharmaceutical market failure that systematically disadvantages LMICs, one in which drugs essential to the health of billions of people are discontinued, repriced or rendered inaccessible by market forces that do not account for the needs of resource-constrained health systems.[5] Addressing this structural issue requires engagement at the level of international pharmaceutical policy makers, including mechanisms to ensure continued availability of essential medicines in LMICs even when commercial demand in HICs has declined.

At the national level, the response of Nigeria to halothane discontinuation must be situated within the broader agenda of health system strengthening and the achievement of UHC. The NSOANP provides a coherent strategic framework but its implementation requires political commitment, adequate financing and sustained engagement across the critical stakeholders from federal and state governments to professional bodies, civil society and international partners.[13,15]

The evidence reviewed in this article suggests that the consequences of halothane discontinuation, though serious, are not irreversible. With deliberate, adequately resourced intervention, the transition can be managed in a manner that not only preserves but ultimately improves the safety and equity of anaesthesia and surgical care in Nigeria. The key prerequisites are political will, financial commitment and recognition of safe anaesthesia as a non-negotiable component of UHC.

CONCLUSION

The discontinuation of halothane production poses a major challenge for anaesthesia practice in Nigeria and across sub-Saharan Africa, exposing systemic vulnerabilities and threatening surgical equity, particularly for children and rural populations. While the alternatives isoflurane, sevoflurane, ketamine-based TIVA and regional anaesthesia exist, the transition to these alternatives requires coordinated, multi-stakeholder efforts in drug subsidisation, infrastructure investment, workforce training and policy implementation. The NSOANP provides a strategic framework but requires sustained political commitment and adequate financing.

Paradoxically, the crisis created by the discontinuation of halothane production presents a transformative opportunity to modernise anaesthesia practice, strengthen perioperative infrastructure, expand training towards equitable surgical systems that Nigeria's population deserves. This opportunity requires that the global health community recognise safe anaesthesia not as a luxury but as a fundamental right and act accordingly.

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