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Indonesian Journal of Health Research and Development **Vol 4 No 2 (2026)** https://doi.org/10.58723/ijhrd.v4i2.653

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Research Article

Expanding Anaesthesia Access in South Africa: Task-Sharing Options and the Regulatory Preconditions for a Nurse-Anaesthetist Cadre

Received: March 11, 2026	Revised: June 30, 2026	Accepted: June 30, 2026	Published: June 30, 2026

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Abstract

Background: South Africa faces an acute shortage of specialist anaesthetists, limiting equitable access to safe surgical care, particularly in rural and secondary-level hospitals. Task-sharing with nurse-anaesthetists has been proposed to close these gaps, yet no such cadre exists in South African law and the South African Nursing Council does not recognise anaesthesia as a nursing specialty. Outside tertiary centres, most anaesthesia is administered by non-specialist medical officers.
Aims: This study examines the roles, training, and regulation of specialist and nurse anaesthetists to develop a framework for expanding anaesthesia access while safeguarding patient safety, and asks whether a nurse-anaesthetist cadre is the appropriate response given the medical officers and clinical associates deployed in district hospitals.
Methods: A qualitative, document-based design integrated peer-reviewed literature, national policies, regulatory guidelines, and international benchmarks. Thematic content analysis spanned ten domains, including workforce distribution, training, supervision, task-sharing, and regulatory oversight, with international comparison.
Results: Structured task-sharing with nurse-anaesthetists may extend services when underpinned by formal training, supervision, and clear regulation, but substantial gaps persist in national accreditation, competency assessment, and implementation. The proposed Integrated Anaesthesia Workforce and Task-Sharing Framework (IAWTF) guides workforce planning, competency development, and service delivery.
Conclusion: A regulated non-physician cadre could help mitigate shortages, but statutory recognition by the South African Nursing Council is a legal precondition, since the Health Professions Council of South Africa has no jurisdiction over nurses. Its merits must be weighed against strengthening the role of medical officers and clinical associates. Future research should evaluate clinical outcomes and cost-effectiveness.

Keywords: Anaesthesia workforce, Nurse-anaesthetists, Patient safety, Specialist anaesthetists, Task-sharing

1. INTRODUCTION

Anaesthesia is a cornerstone of safe surgical care, yet South Africa faces a persistent and acute shortage of specialist anaesthetists, particularly in rural and secondary-level hospitals (Asingei et al., 2022; Mrara, 2025). This inequitable distribution undermines access to essential surgical services and contributes to systemic health disparities, with the majority of anaesthesiologists concentrated in urban centres and private practice (SASA, 2022). Although South Africa allows for non-specialist physicians to provide anaesthetic services in the public sector, access to quality perioperative care remains a significant challenge (Biccard & Madiba, 2015; SASA, 2022). The resulting gap limits the capacity of the health system to deliver timely and safe perioperative care, exacerbating mortality and morbidity for high-risk surgical populations. Comparable workforce shortfalls have also been reported in higher-income systems, underscoring the global dimension of the problem (Royal College of Anaesthetists, 2024). Addressing these shortages is thus critical not only for service delivery but also for advancing broader health equity goals, including those embedded in Sustainable Development Goals 3 and 10. It is important to be precise about who currently provides this care. The majority of anaesthetics administered in South African district and regional hospitals are given not by specialists but by non-specialist medical officers, and it is this cadre, rather than any non-physician provider, that presently carries the public-sector anaesthesia burden outside the tertiary centres (Biccard & Madiba, 2015). South Africa additionally registers a mid-level clinical associate cadre with the Health Professions Council of South Africa (HPCSA), which practises under medical supervision in district hospitals (Doherty et al., 2012). Any account of

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the anaesthesia deficit that considers only specialists and nurse-anaesthetists therefore omits the two cadres that are doing most of the work.

In response to workforce constraints, the introduction of non-physician anaesthesia providers (NPAPs), such as nurse-anaesthetists, has emerged as a potential strategy to expand service coverage. Evidence from low- and middle-income countries suggests that supervised NPAPs may perform selected lower-risk procedures with broadly comparable perioperative outcomes; however, the most rigorous synthesis to date, a Cochrane review of non-randomised studies, concluded that no definitive statement about the relative safety of physician and non-physician anaesthesia is possible because of confounding (Lewis et al., 2013; Bognini et al., 2023). However, in South Africa, formal recognition, accreditation, and regulation of nurse-anaesthetists is absent, creating tension between the need to increase access to safe non-physician anaesthetic care and concerns about patient safety (Yezu et al., 2025). The position is in fact more fundamental than a gap in accreditation. The South African Nursing Council (SANC), the statutory regulator of the nursing profession under the Nursing Act 33 of 2005, does not recognise anaesthesia as a nursing specialty, and no legal category of nurse-anaesthetist exists within the prescribed scope of practice of registered nurses; the closest recognised qualification is specialisation in operating-theatre nursing. Establishing such a cadre would therefore not be a matter of integrating an existing profession into the anaesthesia workforce, but of creating a profession that does not presently exist in law. It would require the SANC to recognise the specialty, to prescribe its scope of practice and to accredit its training before any clinical integration could lawfully occur (SANC, 2005). This paper accordingly treats recognition by the SANC as a precondition of integration rather than as a detail of implementation.

The role of specialist anaesthetists remains central to maintaining high standards of care, yet their limited numbers necessitate workforce diversification and task-sharing models. International frameworks highlight that safe anaesthesia delivery by NPAPs depends on structured training, supervision, clearly defined scopes of practice, and ongoing professional development (Royal College of Anaesthetists, 2023; Pann et al., 2025). In South Africa, pilot frameworks have been proposed, including structured phased models guiding nurse-anaesthetist competency development under facilitator supervision (Holtzhausen et al., 2022), though systemic implementation remains incomplete. This study examined the landscape of anaesthesia provision in South Africa, focusing on the interplay between specialist anaesthetists and nurse-anaesthetists. It investigated workforce distribution, training and accreditation gaps, regulatory frameworks, and stakeholder perspectives. Nurse anaesthetists were situated within the broader policy and health systems context, and the study explored evidence-based pathways to safely extend anaesthesia services and promote equitable access to surgical care. Because anaesthesia outside the tertiary centres is at present delivered largely by non-specialist medical officers, and because a regulated mid-level clinical associate cadre already exists, the study additionally puts the prior question that the international task-sharing literature tends to pass over: whether a nurse-anaesthetist cadre is the appropriate response to the South African anaesthesia deficit at all, or whether the more efficient and more rapidly attainable route lies in strengthening the cadres that are already trained, already registered and already regulated.

2. LITERATURE REVIEW

Stark disparities in distribution and capacity characterise the anaesthesia workforce in South Africa. Specialist anaesthetists are concentrated in urban tertiary hospitals, leaving rural and secondary hospitals underserved (SASA, 2022). With a density of approximately 3 per 100,000 population, South Africa falls well below the WFSA-recommended minimum of 10 per 100,000 (Mrara, 2025). This maldistribution is compounded by the migration of specialists to private sectors or abroad due to low remuneration, poor working conditions, and limited career development, further straining public-sector surgical capacity (Fletcher-Nkile et al., 2022; Keyvanlo et al., 2025).

Non-physician anaesthesia providers are increasingly relied upon to bridge workforce gaps, particularly in low-resource and rural hospitals. Evidence from Sudan, Zambia, and Somaliland demonstrates that NPAPs can manage a substantial proportion of cases, including spinal anaesthesia and intubations, often independently (Mohamed et al., 2025; Karydi et al., 2024). However, adverse events are significantly higher in unsupervised contexts, and systemic supports such as continuing education and formal documentation are frequently lacking (Mohamed et al., 2025). These findings underscore the importance of supervision, structured training, and robust governance to ensure safe task-sharing.

Training, competency, and role clarity emerge as central determinants of NPAP effectiveness. In South Africa and globally, anaesthetic nurses acquire skills through a combination of experiential learning, mentorship, and on-the-job exposure, with considerable variability in knowledge and competence (Spijkerman, 2021; Maharaj et al., 2021). Structured models, such as the four-phase nurse-anaesthesia framework (Holtzhausen et al., 2022), provide a systematic pathway for skill development but face implementation challenges, including resource limitations, variability in clinical exposure, and the need to adapt international best practices to local contexts. International evidence further suggests that advanced competencies extend beyond technical tasks to encompass communication, leadership, perioperative care, and holistic patient management (Pann et al., 2025; Sanclemente-Dalmau et al., 2022).

Regulatory and professional frameworks shape both workforce deployment and quality of care. The South African Society of Anaesthesiologists (SASA) issues practice guidelines that emphasise uniform standards,

supervision and safety, but SASA is a voluntary professional association and not a statutory regulator; it may advocate for a non-physician cadre and articulate professional expectations, yet it can neither accredit such a cadre nor confer a scope of practice upon it (SASA, 2022). The literature highlights the tension between expanding access via task-sharing and maintaining professional standards and patient safety (Yezu et al., 2025; Bognini et al., 2023). Evidence-informed policy must therefore integrate rigorous training, supervision, and stakeholder consensus to safely incorporate nurse anaesthetists, ensuring that task-sharing complements rather than substitutes for the expertise of specialist anaesthetists.

3. THEORETICAL FRAMEWORK

This study adopts a workforce systems and task-sharing perspective, situating anaesthesia provision within the broader South African health system and emphasising the interplay among workforce distribution, training, and regulation in shaping care. Task shifting and task sharing in surgical care allow advanced practice providers to assume specific surgical tasks, potentially improving access and clinical outcomes while addressing workforce shortages. However, knowledge gaps remain regarding their integration and impact on patient care (Modi et al., 2025). Anaesthesia is regarded as a complex healthcare delivery sub-system in which structural, organizational, and individual elements interact to affect service delivery, patient safety, and equitable access. The analysis indicated that redistributing healthcare responsibilities among various personnel can mitigate workforce shortages and improve staff allocation in low-income nations. At the same time, research on the long-term effects, cost-effectiveness, and implementation frameworks remained scarce (Fulton et al., 2011). Specialist anaesthetists and nurse-anaesthetists function as complementary professionals, with their integrated duties, expertise, and oversight influencing the quality and extent of anaesthetic treatments. Task-sharing initiatives enhance the accessibility of anaesthesia without supplanting the proficiency of specialist anaesthetists, safeguarding standards while augmenting coverage. The COATS (Conceptual Framework for Task Shifting and Task Sharing) framework provides a clear definition of task shifting and task sharing, identifies eight essential conditions for successful implementation, and emphasizes the importance of context in shaping outcomes (Orkin et al., 2021). Across Africa, task-shifting and task-sharing strategies have been used to address workforce shortages, better utilize existing staff, and expand access to services, including maternal and child health, surgical care, and emergency care (Okoroafor & Christmals, 2023), as well as the prevention and control of non-communicable diseases (Tesema et al., 2025).

South Africa's 2030 Human Resources for Health Strategy supports these approaches by advocating for fair distribution and effective use of health workers to achieve Universal Health Coverage and reduce ongoing gaps in care (Department of Health, Republic of South Africa, 2020). Task sharing is an approach further supported by national skills-development legislation aimed at reducing inequality and workforce shortages (Reddy et al., 2018). Task shifting and adjustments in workforce skill mix have shown promise in low-income settings, but gaps remain in understanding long-term results, cost-effectiveness, and the best ways to implement these approaches (Fulton et al., 2011). Structured training, mentorship, and precise skill assessment are crucial for nurse anaesthetists to work safely within defined roles, ensuring that task-sharing supports rather than replaces specialist expertise. The framework adopted for this study presents a practical, evidence-based approach to understanding anaesthesia workforce challenges in South Africa. It links workforce planning, training, supervision, regulation, and service outcomes, offering a model that balances the need to expand access with the need to maintain high-quality, safe, and accountable anaesthetic care.

4. MATERIALS AND METHODS

This study employed a qualitative, document-based research design, integrating a literature review with systematic analysis of policy and guideline documents to examine anaesthesia provision in South Africa. Document analysis served as a rigorous qualitative method, enabling structured and reflective interpretation of textual data to generate meaningful insights and support theory development (Bowen, 2009). Although qualitative document analysis provided rich contextual and historical understanding, it was also limited by incomplete records, selective availability, and potential bias, which were carefully considered during interpretation (Morgan, 2022). Data sources included peer-reviewed literature, national health workforce reports, the practice guidelines of the South African Society of Anaesthesiologists (SASA), which is a voluntary professional association rather than a statutory regulator, the regulatory instruments of the Health Professions Council of South Africa (HPCSA), which registers medical practitioners and clinical associates under the Health Professions Act 56 of 1974, the regulatory instruments of the South African Nursing Council (SANC), which registers nurses and midwives under the Nursing Act 33 of 2005, and international guidelines on nurse-anaesthetist training and task-sharing. Thematic content analysis was applied to code data across ten predefined analytical domains, including workforce distribution, training models, supervision, regulatory oversight, patient safety, and competency development. This approach provided a structured yet flexible framework for identifying and interpreting patterns, enhancing transparency and analytical rigour (Ahmed et al., 2025). However, the flexibility inherent in thematic analysis introduced variability in application and interpretation, which was addressed through careful documentation and reflexivity in coding procedures (Ahmed et al., 2025).

In contrast, qualitative content analysis emphasized systematic categorization and the measurement of theme frequencies, offering a quantifiable perspective on data patterns. In comparison, thematic analysis prioritized

interpretive depth and the meanings embedded in the data (Vaismoradi et al., 2013). Both approaches complemented each other in this study, allowing the synthesis of measurable trends with rich contextual understanding, thereby strengthening the credibility and comprehensiveness of findings. A comparative analysis across international contexts, including low- and middle-income countries (LMICs) and high-income countries (HICs), was conducted to identify lessons transferable to South Africa and to highlight gaps in the local health system. Appraisal of each source considered methodological quality, contextual relevance, and potential implications for health system strengthening. Triangulation across multiple sources and cross-validation against national and international policy standards ensured analytical rigour, supporting a synthesised understanding of empirical and conceptual evidence to inform strategic recommendations for workforce expansion and the integration of nurse anaesthetists in South Africa.

5. RESULTS AND DISCUSSION

5.1 Results

5.1.1 Anaesthesia workforce and service delivery in South Africa: roles, training, and safety

Building on the introduction, this analysis is structured around ten interrelated thematic areas that interrogate the landscape of anaesthesia provision in South Africa. These themes, spanning workforce distribution, competency development, supervision and mentorship, regulatory frameworks, task-sharing models, patient safety, non-technical skills, international benchmarks, systemic constraints, and policy implications, serve as lenses for examining both empirical evidence and conceptual gaps.

Anaesthesia workforce shortages and distribution

South Africa's anaesthesia workforce is severely short, with an estimated three anaesthesiologists per 100,000 population, far below the WFSA-recommended minimum of 10 per 100,000 (Mrara, 2025). These specialists are concentrated in urban tertiary hospitals, leaving rural and secondary facilities critically underserved. Despite high retention among locally trained professionals, the uneven distribution exacerbates inequities in surgical access and patient outcomes, highlighting the limitations of relying solely on specialist anaesthesiologists. This gap signals a systemic need for alternative workforce strategies, including task-sharing models, to enhance equitable service delivery.

Non-Physician Anaesthesia Providers (NPAPs) and Task-Sharing

Task-sharing to NPAPs has emerged as a pragmatic response to workforce gaps, particularly in low- and middle-income countries (Chonco, 2024; Mohamed et al., 2025). Evidence suggests that NPAPs can safely manage lower-risk procedures under supervision, but unsupervised practice has been associated with significantly higher adverse-event rates (RR 2.8, 95% CI 1.9-4.1) (Mohamed et al., 2025), an estimate drawn from a single conflict-affected setting and susceptible to case-mix confounding. While NPAPs expand coverage, variability in training, supervision, and documentation reflects systemic weaknesses. The gap in formalized training and regulatory oversight in South Africa underscores the ethical and operational complexities of integrating NPAPs into national anaesthesia services.

Training Models and Competency Frameworks

Structured training models, such as the four-phase nurse anaesthesia framework (Holtzhausen et al., 2022), provide a roadmap for skill acquisition and supervision. However, South Africa lacks nationally accredited programmes, leaving competence and progression inconsistent. Internationally, competency frameworks extend beyond technical skills to include communication, leadership, and patient-centered care (Sanclemente-Dalmau et al., 2022; Pann et al., 2025). The absence of formal curricula and assessment standards in South Africa highlights a gap between theoretical models and practical implementation; recent international work continues to refine how such training can be optimised (Yang et al., 2025).

Regulatory and Professional Oversight

Regulatory authority over anaesthesia providers in South Africa is divided, and the division is decisive for this debate. The HPCSA registers medical practitioners and clinical associates and has no jurisdiction whatever over nurses; the SANC registers nurses and midwives but has not recognised anaesthesia as a nursing specialty; and SASA, although professionally influential, is a voluntary society with no statutory power to license, to accredit or to discipline, and can therefore play an advocacy role only. The omission with respect to non-physician anaesthetists consequently lies with the SANC and not with the HPCSA or SASA, and it is not an ambiguity of licensure so much as the absence of any licensable category at all (SANC, 2005; SASA, 2022). Such regulatory gaps create ethical tensions, where task-sharing could improve access but risks patient safety if unregulated. International guidelines underscore the importance of structured governance and supervision for NPAP integration (Royal College of Anaesthetists, 2023). South Africa's lack of clear policy frameworks is a barrier to scaling nurse anaesthetist programmes safely and sustainably.

Safety, Quality, and Clinical Outcomes

Safety outcomes for NPAPs vary by context, training, and supervision. Although some comparative studies report broadly similar perioperative morbidity and mortality between supervised NPAPs and specialists, a Cochrane review concluded that the non-randomised, confounded evidence base does not permit a definitive judgement on the relative safety of the two models (Lewis et al., 2013); unsupervised practice, by contrast, has been associated with markedly higher adverse-event rates (RR 2.8, 95% CI 1.9-4.1) (Mohamed et al., 2025), albeit in a single conflict-affected setting in which case-mix confounding cannot be excluded. This evidence underscores that competence is contingent on structured

education, clinical oversight, and system-level support. A knowledge gap remains regarding long-term outcomes and complex procedures, limiting generalizability across diverse surgical settings.

Economic and Remuneration Influences

Economic factors, including low pay and limited financial incentives, significantly influence the recruitment and retention of anaesthesiologists (Keyvanlo et al., 2025). However, training alone does not resolve shortages; systemic governance, role clarity, and professional recognition are equally influential. These findings indicate that workforce planning must integrate both monetary and non-monetary strategies, revealing gaps in purely incentive-based policy approaches.

Urban-Rural and Public-Private Disparities

Anaesthesiologists are heavily concentrated in urban private sectors, which serve only 16% of the population, leaving public hospitals and rural communities underserved (Mrara, 2025). These inequities amplify barriers to safe surgical care and highlight systemic maldistribution. While task-sharing offers a partial solution, the rural context demands tailored workforce strategies, including robust supervision, context-appropriate training, and resource allocation, areas that are currently underdeveloped in South Africa.

Trends in medical schemes claims data reinforce this picture of maldistribution within the privately funded sector. Drawing on the Council for Medical Schemes (CMS)' 2024 benefits-paid and provider-distribution datasets, 1,549 anaesthetist practices billed medical schemes nationally, serving approximately 910,521 beneficiaries (about 9.9% of the 9.17 million covered lives) and accounting for R6.24 billion in benefits paid, equivalent to about 2.5% of the R249.76 billion in total benefits paid by medical schemes that year. Some 79.8% of the amount claimed by anaesthetists was reimbursed, and almost all expenditure (approximately 99.6%) was funded from risk pools rather than members' medical savings, consistent with anaesthesia being predominantly an in-hospital cost. The geographic concentration is pronounced: Gauteng (44.6%), the Western Cape (23.4%) and KwaZulu-Natal (10.8%) together accounted for 78.8% of anaesthetist practices, even though these three provinces hold 68.9% of beneficiaries, whereas Limpopo and the Northern Cape each accounted for only 0.8%. Expressed as a ratio, there were 3,900 to 5,200 beneficiaries per anaesthetist practice in the Western Cape and Gauteng, compared with about 42,400 in Limpopo and 23,400 in Mpumalanga, a near ten-fold disparity. That such steep provincial gradients persist even among the better-resourced, privately insured minority underscores the structural nature of anaesthesia workforce maldistribution in South Africa and the limits of relying on specialist supply alone to achieve equitable access (CMS, 2024). Two qualifications attach to these figures. They describe the privately funded sector alone, and therefore speak to maldistribution among the 9.17 million beneficiaries of medical schemes rather than among the majority of the population that depends on public facilities. They are adduced here as evidence of the structural and geographic character of anaesthesia maldistribution in South Africa, and not as a proposal to deploy a non-physician cadre in private hospitals, which would raise distinct questions of reimbursement, scheme benefit design, medico-legal liability and professional indemnity that lie beyond the scope of this study. The task-sharing case advanced below is a case about public-sector district and regional hospitals.

Professional Resistance and Stakeholder Perspectives

Specialist anaesthesiologists exhibit mixed perspectives on nurse-anaesthetist integration: some support supervised practice to address shortages, while others fear independent NPAP practice may compromise safety (Yezu et al., 2025). This tension reflects broader debates over professional boundaries, ethical responsibility, and patient safety. A deficiency exists in stakeholder involvement and consensus-building to guide national labour policy, suggesting that technical solutions alone are insufficient without inclusive policy discourse.

Technical and Non-Technical Competencies

Evidence indicates that anaesthetic nurses develop strong technical skills, including pharmacology, airway management, and perioperative care, as well as non-technical skills such as teamwork, communication, and decision-making (Spijkerman, 2021; Pann et al., 2025). However, competence is highly variable due to inconsistent training and mentorship. This variability creates uncertainty regarding the scope of practice and highlights a need for standardised curricula and competency assessment to bridge the gap between skill acquisition and safe clinical practice.

International Comparisons and Lessons for South Africa

Global evidence demonstrates that formally trained and regulated nurse-anaesthetists can safely extend access to surgical care in both LMICs and high-income contexts, with outcomes dependent on structured supervision and competency frameworks (Henschke, 2025; Bognini et al., 2023). South Africa lags in formalization, regulation, and national training programmes, presenting an opportunity to adapt international best practices while addressing local resource constraints, governance challenges, and equity considerations. The literature underscores a critical research gap in evaluating implementation outcomes and contextual adaptation in the South African setting.

Which Cadre? Situating the Proposal among South Africa's Existing Anaesthesia Providers

The South African context differs from the low- and middle-income settings from which most of the task-sharing evidence is drawn, and the difference is material rather than incidental. In Sudan, Zambia and Somaliland the non-physician anaesthetist fills a vacuum in which no physician of any kind is reliably available (Mohamed et al., 2025; Karydi et al., 2024). South Africa's vacuum

is of a different shape. The country retains a substantial cadre of non-specialist medical officers, including community-service doctors, who already administer the greater part of district-level anaesthesia (Biccard & Madiba, 2015), and it has since 2009 trained and registered clinical associates, a mid-level cadre that practises under medical supervision and whose scope is determined by the HPCSA (Doherty et al., 2012). The relevant counterfactual for South Africa is therefore not the nurse-anaesthetist against nothing, which is the comparison the international literature implicitly makes, but the nurse-anaesthetist against better-trained, better-supervised and better-retained medical officers and clinical associates.

This reframing bears directly on feasibility and on time. Creating a nurse-anaesthetist cadre would require the SANC to recognise a new specialty, promulgate a scope of practice, accredit curricula and register practitioners, a regulatory sequence that, on the record of comparable nursing specialty reforms, is measured in years rather than months. Strengthening structured anaesthesia training, supervision and continuing professional development for medical officers, or examining whether the clinical associate scope could be extended to selected anaesthetic tasks, would by contrast operate within a regulatory architecture that already exists and a registration system that already functions. On any reasonable assessment of implementation lag, the second route reaches an underserved district hospital appreciably sooner than the first.

None of these disposes of the case for a nurse-anaesthetist cadre, but it changes what that case must establish. Its proponents must show that the cadre would add capacity which the existing cadres cannot supply, that its marginal safety profile under realistic supervision conditions is acceptable, and that the substantial regulatory investment it demands is justified relative to the alternatives. The literature reviewed for this study does not make that showing, and the candid conclusion is that the prior question of cadre choice remains unresolved. It ought to be settled by explicit comparative analysis before a scope-of-practice reform is pursued, and not after.

5.1.2 Integrated anaesthesia workforce and task-sharing framework (IAWTF)

The IAWTF depicted in Figure 1 below conceptualizes anaesthesia provision in South Africa as a dynamic interaction between workforce capacity, competency development, regulatory oversight, and service delivery outcomes. It positions specialist anaesthetists and nurse-anaesthetists as complementary actors whose training, supervision, and scope of practice determine patient safety, quality of care, and equitable surgical access. The framework links three core domains. Workforce Distribution and Retention, capturing urban-rural and public-private disparities. Training and Competency Development, encompassing structured curricula, mentorship, and technical/non-technical skill acquisition; and Regulatory and Governance Structures, including accreditation, licensure, and supervision standards. These domains interact to influence Service Outcomes, such as procedural safety, access to care, and ethical compliance, while external contextual factors (economic, systemic, and stakeholder perspectives) moderate implementation feasibility.

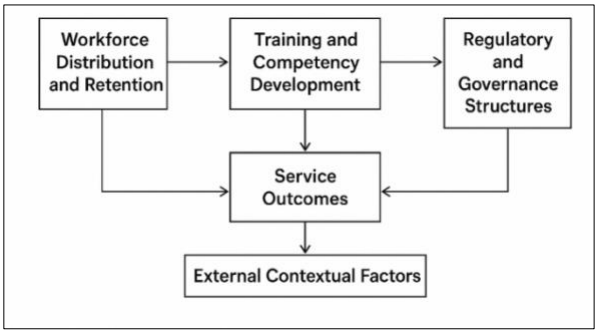


Figure 1. Integrated Anaesthesia Workforce and Task-Sharing Framework

5.2 DISCUSSION

The South African Society of Anaesthesiologists reports a noticeable shortage of expert anaesthetists in South Africa (SASA, 2022; Mrara, 2025). The majority of these specialists are employed in urban hospitals and the private sector, leaving rural and secondary facilities chronically underserved. As a result of this uneven distribution, the availability of safe surgical procedures is reduced, with real ramifications for patient safety and clinical outcomes (Asingei et al., 2022). The purpose of this study was to investigate how nurse anaesthetists and specialist anaesthetists contribute to service delivery. To do this, the study examined the distribution of the workforce, training programs, and regulatory frameworks. According to the evidence, the public's needs cannot be met by relying entirely on physician anaesthetists. As a result, increasing the number of people employed through task distribution is both necessary and practical to enhance fairness in surgical care (Lewis et al., 2013; Bognini et al., 2023). This phenomenon is mirrored in the privately funded sector, where 2024 medical-scheme data show that Gauteng and the Western Cape alone account for more than two-thirds of all anaesthetist practices, while provinces such as Limpopo and the Northern Cape remain markedly underserved (CMS, 2024).

Task-sharing with nurse anaesthetists has emerged as a promising solution, particularly in underserved areas. Experiences from some of the African countries have shown that, with proper supervision, nurse anaesthetists can safely manage a large proportion of anaesthetic procedures (Mohamed et al., 2025; Karydi et al., 2024). However, the risks increase substantially when practice occurs without supervision, highlighting the need for clear guidance and robust training systems (Mohamed et al., 2025). In South Africa, pilot programmes such as the phased nurse-anaesthesia model have provided a structured roadmap for skills development. However, these projects have been implemented inconsistently and mainly remain unscaled (Holtzhausen et al., 2022).

The disparity between theory and reality is directly related to the study's objective of assessing safe avenues

for integrating nurse anaesthetists into the workforce. Competency development encompasses both technical and non-technical skills. The study revealed that non-technical abilities, including leadership, communication, and sound perioperative decision-making, are essential for safe and effective anaesthesia practice (Sanclemente-Dalmau et al., 2022; Spijkerman, 2021; Pann et al., 2025). In South Africa, variability in these skills among nurse-anaesthetists reflects inconsistent mentorship, training opportunities, and assessment protocols (Maharaj et al., 2021; Spijkerman, 2021). International evidence highlights that formal curricula, accreditation, and ongoing professional development are critical for professional credibility and patient safety (Henschke, 2025; Royal College of Anaesthetists, 2023). These findings underscore a significant gap in national standards and reinforce the need for context-specific, evidence-informed frameworks, aligning with the study's objective of exploring training and professional development mechanisms.

The integration of nurse-anaesthetists depends heavily on regulatory clarity and stakeholder engagement. Licensure ambiguities, unclear scopes of practice, and resistance from specialist anaesthetists pose barriers to the safe expansion of NPAP roles (SASA, 2022; Yezu et al., 2025). The study findings indicate that achieving balance requires inclusive policy dialogue, clear governance, and structured supervision, consistent with international best practices (Royal College of Anaesthetists, 2023; Bognini et al., 2023). South Africa's lack of robust national frameworks and evidence of implementation represents both a policy and a research gap. Addressing this gap is essential for building trust, ensuring safety, and sustainably expanding anaesthesia services to meet the needs of all communities. Two qualifications temper this conclusion and follow from the regulatory analysis above. First, the barrier in South Africa is not that the regulators have addressed the nurse-anaesthetist inadequately but that the category does not exist: the SANC has not recognised anaesthesia as a nursing specialty, the HPCSA has no jurisdiction over nurses, and SASA can advocate but cannot regulate. Recognition of the specialty by the SANC is therefore a precondition of integration rather than a refinement of it. Second, because South Africa already deploys non-specialist medical officers and clinical associates in precisely the district and regional facilities where the deficit is greatest, the policy question is genuinely comparative, and this study is not in a position to resolve it on the evidence reviewed.

5.2.1 Implications

The findings of this study carry several implications for policy and practice. Evidence suggests that structured task-sharing, supported through formalized training and supervision, can help address workforce shortages while maintaining high standards of care. For service delivery, integrating nurse-anaesthetists into supervised task-sharing models offers a practical route to extending safe surgical access in underserved rural and secondary-level settings without displacing the central role of specialist anaesthetists. For policy, the findings imply that the safe expansion of non-physician anaesthesia provider roles depends on establishing national accreditation standards, clearly defined scopes of practice, and structured supervision, underpinned by inclusive stakeholder dialogue and clear governance. Collectively, these implications point to task-sharing as a means of advancing equity of access to anaesthetic care while safeguarding patient safety.

5.2.2 Research Contribution

The principal contribution of this study is the development of the Integrated Anaesthesia Workforce and Task-Sharing Framework (IAWTF), which conceptualizes specialist anaesthetists and nurse anaesthetists as interdependent contributors to safe and equitable surgical care. The framework identifies three interconnected domains: workforce distribution and retention; training and competency development; and regulatory and governance structures, which collectively shape service outcomes such as patient safety, procedural quality, and access to care. Read together, the points above constitute an interpretive synthesis of secondary evidence rather than primary findings, and the recommendations that follow are derived from that synthesis rather than from new data.

5.2.3 Limitations

Several limitations should be borne in mind. As a document-based synthesis of secondary sources, the study is subject to publication bias and to the selective availability and completeness of the policy and guideline documents reviewed; it generated no primary data and did not evaluate clinical outcomes directly. Much of the supporting evidence derives from other low- and middle-income settings, so its transferability to the South African context is uncertain, and the absence of standardised outcome data for complex or high-risk procedures further constrains the conclusions that can be drawn. A further and more consequential limitation is that the study did not undertake the comparative appraisal that its own analysis shows to be necessary: it did not evaluate the case for expanding anaesthesia provision by non-specialist medical officers or by clinical associates against the case for creating a nurse-anaesthetist cadre. The framework advanced here should accordingly be read as clarifying the conditions under which a non-physician cadre could be integrated safely, and not as establishing that such a cadre is the option South Africa should prefer.

5.2.4 Suggestions

Building on these findings, future research should investigate the real-world implementation of nurse-anaesthetist integration, including longitudinal studies of clinical outcomes, cost-effectiveness, and workforce impact, as well as the development of context-specific training and regulatory models to inform national policy and strengthen the health system.

6. CONCLUSION

South Africa's anaesthesia workforce faces significant challenges, with specialist anaesthetists concentrated in urban and private settings, leaving rural and secondary hospitals underserved. The study demonstrates that nurse-anaesthetists, when integrated through structured training, supervision, and clear regulatory frameworks, can play a complementary role in expanding access to safe surgical care. The IAWTF provides a practical model to guide workforce planning, competency development, and governance, addressing both equity and quality. While gaps remain in national accreditation, regulatory clarity, and evaluation of outcomes in complex surgical procedures, this research highlights actionable pathways to strengthen the health system. As a necessary next phase, translating the IAWTF into practice will require a dedicated implementation and policy-readiness process, encompassing national accreditation standards, a phased competency and supervision pathway, and structured stakeholder consensus, so that the system is adequately prepared to achieve its workforce goals. Future efforts should focus on empirical evaluation, policy development, and stakeholder engagement to ensure that task-sharing strategies are implemented safely, effectively, and sustainably, ultimately enhancing access to anaesthetic services across South Africa.

7. ACKNOWLEDGEMENT

The author gratefully acknowledges the contributions of Dr Toko Potelwa, Dr Samantha Iyaloo, and colleagues within the Policy Research and Monitoring Unit at the CMS. Their insights, technical input, and ongoing engagement significantly supported the development of this study. Appreciation is also extended to broader stakeholders in the health financing and policy community for their guidance and support throughout the research process.

AUTHOR CONTRIBUTION STATEMENT

MW conceptualised the study, developed the research framework, conducted the analysis, and wrote the manuscript. The author reviewed and approved the final version of the manuscript.

ETHICS STATEMENT

This study did not involve human participants, animals, or personally identifiable data. It analysed only publicly available published literature and policy and guideline documents; ethical approval was therefore not required.

FUNDING STATEMENT

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

COMPETING INTERESTS STATEMENT

The author declares no financial or personal relationships that could be construed as a competing interest in relation to this work.

DATA AVAILABILITY STATEMENT

All data supporting the findings of this study are derived from the publicly available sources cited in the reference list; no new datasets were generated or analysed.

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