

MINI-REVIEW

Task-shifting and task-sharing for surgical
workforce sustainability in sub-Saharan Africa:
A narrative review of cost-effectiveness and
retention evidenceArole Darwin Touko^{1,2,3*}  and Ruth Tabi Amin^{3,4} ¹Data Science Center for the Study of Surgery, Injury, and Equity in Africa (D-SINE Africa), Buea, Cameroon²Division of Global Surgery, Faculty of Health Sciences, University of Cape Town, Cape Town, Western Cape, South Africa³Hope In Pink Foundation, Buea, Cameroon⁴Department of Public Health, Faculty of Health Sciences, University of Buea, Buea, Cameroon

Abstract

Sub-Saharan Africa (SSA) carries a disproportionate share of the global surgical disease burden against a severely constrained surgical, obstetric, and anesthesia workforce. Task-shifting and task-sharing, the delegation of selected surgical tasks to non-physician clinicians (NPCs), have been widely promoted as a pragmatic response, and existing systematic reviews report broad clinical non-inferiority of NPC-performed procedures relative to specialist-performed equivalents. Far less attention has been paid to whether task-shifting represents a fiscally and organizationally sustainable long-term workforce strategy rather than a stopgap measure. This review synthesizes the existing evidence on the cost-effectiveness and workforce sustainability (retention, attrition, regulatory durability) of surgical task-shifting in SSA, reframing the discussion from a clinical-safety question to a health-systems sustainability and financing question. A purposive search of PubMed and Google Scholar was conducted for English and French language studies published between 2007 and 2026, using terms including “task-shifting,” “non-physician clinician,” “surgical workforce,” “cost-effectiveness,” “retention,” and “sub-Saharan Africa,” supplemented by manual searching of reference lists from identified reviews. Disability-adjusted life year-based costing studies place several NPC training programs among the most cost-effective health interventions documented in low-income settings. However, the retention literature points to attrition driven by inadequate remuneration, unclear career progression, and weak regulatory recognition, factors that, if unaddressed, erode the long-run cost advantage that makes task-shifting attractive. Task-shifting is best understood not as a permanent low-cost substitute for specialist surgical care, but as a conditionally sustainable strategy whose financial advantages depend on parallel investment in retention, regulation, and career pathways.

Keywords: Task-shifting; Task-sharing; Surgical workforce; Sub-Saharan Africa; Cost-effectiveness; Non-physician clinicians; Workforce retention; Global surgery

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1. Introduction

Surgically treatable conditions represent a substantial and growing component of the global burden of disease, yet access to safe, affordable, and timely surgical care remains profoundly inequitable. The Lancet Commission on Global Surgery quantified this gap with particular clarity, estimating that five billion people worldwide lack access to safe surgical and anesthesia care when needed, and that 143 million additional surgical procedures are required annually to meet global need (Chu *et al.*, 2009). The Commission identified scaled-up surgical workforce capacity as a non-negotiable precondition for universal health coverage, and set time-bound targets for surgical workforce density and procedure volume that most low- and middle-income countries remain far from meeting (Chu *et al.*, 2009).

The drivers of sub-Saharan Africa (SSA)'s surgical workforce shortage are well characterized. Chu *et al.* (2009) documented that inadequate salaries, poor working conditions, insufficient numbers of medical training institutions, and the sustained outward migration of trained health personnel to resource-rich countries collectively underpin the crisis (Meara *et al.*, 2015). These structural drivers operate at multiple levels simultaneously and are self-reinforcing: low remuneration reduces retention, reduced retention increases workload on remaining staff, and deteriorating working conditions accelerate further migration, a dynamic that formal workforce expansion alone cannot readily reverse (Meara *et al.*, 2015).

Given the structural improbability of rapidly expanding the supply of specialist surgeons within the timeframes required to meet population need, task-shifting, the delegation of selected surgical, obstetric, and anesthetic tasks to non-physician clinicians (NPCs), variously referred to as clinical officers, associate clinicians, or medical licentiates depending on country context, has become the most widely adopted surgical workforce strategy in the region (Meara *et al.*, 2015). Chu *et al.* (2009) observed that in the absence of formally trained surgeons, surgical tasks are frequently performed *de facto* by non-specialist clinicians operating with little supervisory or training infrastructure, a pattern that reveals an important distinction between informal, unstructured task-shifting and deliberately designed, institutionally supported cadre-based models.

A substantial body of research has since examined whether NPC-performed procedures are clinically equivalent to specialist-performed equivalents. A systematic review of the existing literature on surgical task-shifting and task-sharing in SSA found that most

studies assessing clinical outcomes demonstrated non-inferiority of procedures performed by non-specialist clinicians across a range of surgical case types. However, the authors noted considerable heterogeneity in clinician training backgrounds, surgical case mix, and outcome variables across the underlying primary studies, which limits generalization (Ryan *et al.*, 2023). This clinical-safety question is, by now, reasonably well addressed in the literature.

What has received far less systematic attention is the sustainability question: is task-shifting a fiscally sound, durable workforce strategy, or a short-term cost-saving measure whose long-run advantages are progressively eroded by poor retention, weak regulatory recognition, and inadequate institutional support? This distinction carries direct implications for health economics and health policy audiences, because the case for task-shifting is frequently articulated in cost terms, yet the workforce attrition literature suggests that the long-run cost profile may look substantially different from the short-horizon, unit-cost comparisons that dominate the existing evidence base. This review synthesizes the cost-effectiveness and workforce sustainability literatures on surgical task-shifting in SSA, a combination that has not been the explicit focus of any prior review in this space, and proposes a reframing of the policy question accordingly.

2. Methods

A purposive literature search was conducted across PubMed and Google Scholar for studies published between 2007 and 2026, using combinations of the search terms “task-shifting,” “task-sharing,” “non-physician clinician,” “clinical officer,” “surgical workforce,” “cost-effectiveness,” “DALY,” “retention,” “attrition,” and “sub-Saharan Africa.” Given the existence of recent formal systematic reviews on the clinical-outcomes dimension of surgical task-shifting (Chu *et al.*, 2009; Ryan *et al.*, 2023), this review draws on those syntheses for the safety/efficacy summary rather than re-screening primary studies, and instead concentrates original synthesis effort on the cost-effectiveness and workforce-sustainability literatures. Reference lists of identified reviews were manually searched for additional relevant primary studies. No formal risk-of-bias appraisal, dual screening, or Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) reporting was undertaken, consistent with the narrative review format; this is stated as a limitation in Section 9.

The following inclusion criteria guided the selection of sources: studies were included if they reported primary data, systematic review findings, or formal costing analyses specifically relating to surgical, obstetric, or anesthetic

task-shifting by NPCs in SSA health system contexts; commentaries, opinion pieces, and studies exclusively addressing task shifting outside the surgical domain were excluded. A total of 10 sources met these criteria and are synthesized in this review.

3. The surgical workforce shortage in sub-Saharan Africa

The shortage of surgical, obstetric, and anesthesia providers in SSA is well documented. In the absence of trained surgeons, surgical tasks are often performed *de facto* by non-specialist physicians and NPCs, frequently without a formal supervisory or training framework in place (Chu *et al.*, 2009). The Lancet Commission on Global Surgery quantified the scale of the resulting gap in surgical access, finding that of the estimated 313 million surgical procedures undertaken worldwide each year, only a small fraction occur in the poorest countries, where the unmet surgical need is greatest (Meara *et al.*, 2015).

4. Clinical outcomes: A brief summary of the established evidence

Several systematic reviews have examined clinical outcomes of NPC-performed surgery in SSA. Ryan *et al.* (2023) found that most studies assessing clinical outcomes demonstrated non-inferiority of procedures performed by non-specialist clinicians compared to specialist-performed equivalents, while noting substantial heterogeneity in training pathways, surgical case types, and outcome definitions across the underlying primary studies, which limits formal pooling of effect estimates (Ryan *et al.*, 2023). This body of evidence, although not the focus of the present review, serves as the necessary precondition for the cost and sustainability questions addressed below.

5. Cost-effectiveness evidence

The cost-effectiveness literature on surgical task-shifting in SSA is smaller and more heterogeneous than the clinical-outcomes literature, but the available studies point in a consistent direction.

The most frequently cited disability-adjusted life year (DALY)-based costing analysis comes from Malawi's orthopedic clinical officer (OCO) program. Grimes *et al.* (2014) reviewed hospital logbooks across seven district hospitals over a six-month period and found that the OCO program achieved a total cost-effectiveness of USD 92.06 per DALY averted, with a mean per-hospital cost-effectiveness of USD 138.75 (95% CI: USD 69.58–207.91) per DALY averted, which the authors characterized as highly cost-effective relative to other documented

health interventions in low-income settings. The original description of the OCO program by Mkandawire *et al.* (2008) noted that, since the program's founding in 1985, 117 orthopedic clinical officers had been trained, of whom 82 remained in clinical practice, managing 80%–90% of Malawi's orthopedic workload against a backdrop of only nine practicing orthopedic surgeons nationally.

A related costing comparison of two government district hospitals in SSA found total cost per DALY averted of USD 26 (range 17–66) at Thyolo District Hospital in Malawi and USD 363 (range 187–881) at Bo District Hospital in Sierra Leone, with government district hospitals, which rely heavily on NPC-delivered care, are likely to be highly cost-effective and therefore worthy of investment as countries progress toward universal health coverage (Grimes *et al.*, 2017).

Earlier qualitative research from Mozambique's longstanding mid-level cadre program similarly found that health professionals regarded the delegation of major surgical procedures, including cesarean sections and other emergency obstetric interventions, to mid-level practitioners as a broadly accepted and necessary response to acute specialist scarcity, despite some professional resistance (Cumbi *et al.*, 2007).

Taken together, the cost-effectiveness literature supports the conclusion that task-shifting reduces both the unit cost of training providers and, in several documented cases, the cost per favorable health outcome achieved. However, this literature is overwhelmingly cross-sectional or short-horizon in design: the costing analyses cited above capture training costs and a defined service-delivery period but do not extend the time horizon far enough to capture the effect of staff attrition on lifetime return on training investment. This is the central gap this review seeks to highlight.

It should be noted that the strength of evidence underpinning the cost-effectiveness conclusions varies across included studies. The DALY-based costing analyses by Grimes *et al.* (2014) and Grimes *et al.* (2017) are the most methodologically detailed. However, they are based on single-country settings and limited observation periods, which constrain the generalizability of their findings. The qualitative evidence from Cumbi *et al.* (2007) provides contextual depth but cannot support quantitative cost generalizations.

6. Workforce sustainability: Retention, attrition, and regulatory durability

If the cost-effectiveness case for task-shifting rests partly on lower training costs per provider, that case weakens considerably where attrition is high, because the fixed

training investment must then be amortized over a shorter effective service life or repeated. The retention and sustainability literature, while smaller than the cost-effectiveness literature, raises exactly this concern.

Gajewski *et al.* (2022) conducted a longitudinal qualitative study of Malawi's first cohort of clinical officers trained to BSc level in surgery, interviewing 16 trainees during training in 2015 and 15 of the same cohort again after graduation in 2019. Of the 11 who had originally intended to take up a post at a district hospital, only six ultimately did so. The main barriers to remaining in a district hospital post included low and inconsistently paid salaries, limited promotional opportunities within the government system, and insufficient recognition of their surgical skills and BSc-level qualification; the authors concluded that the sustainability of surgically trained NPCs in Malawi is not assured and that further work is required to develop and implement successful, multi-sector retention strategies (Gajewski *et al.*, 2022).

Van Heemskerken *et al.*'s (2020) scoping review of barriers to NPC-performed surgery across SSA found that workforce-related barriers spanning training, field supervision, composition of the surgical team, career development, employment conditions, workload, and retention constituted the largest single category of documented barriers (96 barrier counts across 40 articles), alongside a separate category of barriers relating to regulation and acceptability of surgical task-shifting (64 barrier counts across 27 articles). The review concluded that training NPCs to perform surgery is necessary but not sufficient: sustained service delivery also depends on the availability of supporting surgical team members, infrastructure, and supplies, and retention at the rural level needs to be addressed through improved supervision, adequate remuneration, and reasonable workloads (van Heemskerken *et al.*, 2020).

Gajewski *et al.*'s (2017) qualitative study of Zambia's Medical Licentiate program, based on 43 interviewees including medical licentiates, their district hospital colleagues, surgeon-supervisors, and national stakeholders, described medical licentiates as having advanced clinical skills, including training in elective and emergency surgery, designed as a deliberately sustainable response to the surgical needs of rural populations. The study identified the need for clearer career paths and opportunities, professional recognition, and suitable employment options as key policy lessons for sustaining this cadre, both within Zambia and in other countries in the region that use NPCs to deliver essential surgery (Gajewski *et al.*, 2017).

7. Synthesis: Reframing task-shifting as a conditional, not unconditional, sustainability strategy

Read together, the cost-effectiveness and retention literatures support a more conditional conclusion than either body of evidence suggests in isolation. The cost-effectiveness literature demonstrates that task-shifting can be highly cost-effective at the point of training and initial service delivery (Grimes *et al.*, 2014; Grimes *et al.*, 2017). The retention literature demonstrates that these cost advantages are not self-sustaining; they depend on parallel investment in remuneration, regulatory recognition, supervision, and career progression, the absence of which drives attrition and forces costly re-training cycles (Gajewski *et al.*, 2017; Gajewski *et al.*, 2022; van Heemskerken *et al.*, 2020). This suggests that the appropriate framing for health economics and policy audiences is not “is task-shifting cost-effective?” a question the existing literature has answered, conditionally, in the affirmative, but rather “under what institutional and financing conditions does the cost-effectiveness of task-shifting hold over a realistic service-life horizon?” Programs with formal cadre recognition and structured ongoing supervision, such as Zambia's Medical Licentiate model (Gajewski *et al.*, 2017), appear designed specifically to address the regulatory and career-progression weaknesses that the Malawi retention study identified as the central threat to sustainability (Gajewski *et al.*, 2022).

8. Policy and research implications

Three implications follow for health economics and policy audiences. First, costing studies of task-shifting programs should, where data permit, extend their time horizon to incorporate attrition-adjusted lifetime cost-effectiveness, rather than reporting training and short-run service-delivery costs alone, building on the costing methodology established by Grimes *et al.* (2014) and Grimes *et al.* (2017). Secondly, investment in task-shifting programs should be explicitly paired with investment in the retention infrastructure—including adequate remuneration, regulatory recognition, and defined career ladders—that Gajewski *et al.* (2022) and van Heemskerken *et al.* (2020) identify as essential to sustainability, rather than treating training as a one-off capital expenditure. Third, national surgical, obstetric, and anesthesia plans being developed across the region, consistent with the workforce-scaling targets set out by the Lancet Commission on Global Surgery (Meara *et al.*, 2015), should incorporate workforce retention indicators, not only workforce production targets, as core monitoring metrics.

A few gaps represent priorities for future research. First, the fact that no study to date has conducted an attrition-adjusted, long-run cost-effectiveness analysis of a surgical NPC cadre, accounting for the full lifecycle of training investment relative to actual service years delivered, underscores the need for such a study to test the sustainability claim empirically. Second, the available retention literature is almost entirely qualitative and concentrated in Malawi and Zambia; quantitative, multi-country studies tracking NPC attrition rates and their economic consequences over time would substantially strengthen the policy evidence base. Third, the regulatory and recognition dimension of sustainability, the question of how formal scope-of-practice legislation and cadre recognition affect both retention and service quality, is theoretically acknowledged but empirically underdeveloped across the region. Future research should explicitly measure regulation as a variable rather than merely describe it as a contextual feature.

9. Limitations

This is a narrative review and does not follow PRISMA reporting standards, employ a fully reproducible systematic search strategy, or apply formal risk-of-bias appraisal to the included studies; it should not be read as a substitute for a systematic review or meta-analysis on either the cost-effectiveness or retention questions. The underlying primary literature is also unevenly distributed across countries, with Malawi, Mozambique, and Zambia disproportionately represented relative to other SSA countries, which may limit generalizability. Cost-effectiveness studies, in particular, vary in their costing methodologies, which constrain direct cross-study comparisons and were not formally adjusted for in this synthesis.

Additionally, the conclusions of this review are constrained by the heterogeneous nature of the included studies. The primary studies draw on different costing methodologies, different definitions of task-shifting, different NPC cadres with varying levels of training and supervision, and different health system contexts, heterogeneity that prevents formal pooling of effect estimates and limits direct cross-study comparison even within the cost-effectiveness literature. The narrative review design, while appropriate for an exploratory synthesis of this kind, does not permit a formal assessment of the quality or risk of bias of the included studies, and the conclusions reflect the direction of the available evidence rather than a weighted appraisal of its strength. These constraints should be kept in mind when interpreting the policy implications proposed in Section 8.

10. Conclusion

Surgical task-shifting in SSA has a well-established evidence base for clinical non-inferiority (Chu *et al.*, 2009; Ryan *et al.*, 2023) and short-horizon cost-effectiveness (Grimes *et al.*, 2014; Grimes *et al.*, 2017). What remains underdeveloped is the evidence connecting these favorable short-run findings to long-run workforce sustainability. The retention and attrition literature suggests that the financial case for task-shifting cannot be treated as fixed: it is conditional on sustained investment in remuneration, regulation, supervision, and career progression for non-physician surgical cadres (Gajewski *et al.*, 2017; Gajewski *et al.*, 2022; van Heemskerken *et al.*, 2020). Reframing task-shifting from a clinical-safety question to a health-systems financing and sustainability question, and building the attrition-adjusted costing evidence base needed to support that framing, is a necessary step for global surgery and global health economics research alike.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Author contributions

Conceptualization: Arole Darwin Touko

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All authors have read and approved the final manuscript.

Ethics approval and consent to participate

Ethical approval was not required for this study. This manuscript is a narrative review of previously published, publicly available literature and does not involve the collection, use, or analysis of primary data from human participants.

Consent for publication

Not applicable.

Availability of data

This is a narrative review, and no primary data were generated or analyzed during this study. All data supporting the conclusions are derived from previously published studies cited in the reference list, which are available from the respective publishers.

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