

ORIGINAL RESEARCH ARTICLE

Requirements and costs for scaling up comprehensive emergency obstetric and neonatal care in health centres in Tanzania

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Angelo S. Nyamtema^{1,2}, Godfrey Mtey¹, John C. LeBlanc^{3*}

Tanzania Training Centre for International Health, Tanzania¹; St. Francis University College of Health Sciences, Tanzania²; Dalhousie University, Canada³

*For Correspondence: Email: John.LeBlanc@dal.ca, Phone: +1 902 470-8930

Abstract

The objective of this study was to identify and determine the costs of essential components of a resource package and strategies for scaling up comprehensive emergency obstetric and neonatal care services in Tanzania. Essential components were identified through lessons learned during implementation of comprehensive emergency obstetric and neonatal care and regular discussions with key stakeholders. The related costs were collected from the health centres, Tanzania Medical Store Department and non-governmental organizations that had upgraded health centres for comprehensive emergency obstetric and neonatal care services provision. The results showed that the estimated costs of upgrading a health centre to provide comprehensive emergency obstetric and neonatal care services was \$256,650 (USD) for infrastructure and equipment, \$4,463 per person for upgrading skills in either in comprehensive emergency obstetric and neonatal care or anaesthesia for three months and \$43,500 per year for medicines and supplies. The total cost for all components per health centre was estimated at \$560,802. Scale up required many complementary strategies at all health system levels. Scale up of comprehensive emergency obstetric and neonatal care services in health centres in underserved areas is feasible and urgently needed in resource-limited countries. (*Afr J Reprod Health 2021; 25[3s]: 84-91*).

Keywords: Requirements for CEmONC, CEmONC costs, health centre, scale up of CEmONC, Tanzania

Résumé

L'objectif de cette étude était d'identifier et de déterminer les coûts des composants essentiels d'un ensemble de ressources et de stratégies pour étendre les services complets de soins obstétricaux et néonataux d'urgence en Tanzanie. Les éléments essentiels ont été identifiés grâce aux enseignements tirés lors de la mise en œuvre de soins obstétricaux et néonataux d'urgence complets et de discussions régulières avec les principales parties prenantes. Les coûts correspondants ont été collectés auprès des centres de santé, du département de pharmacie de Tanzanie et d'organisations non gouvernementales qui avaient modernisé les centres de santé pour une prestation complète de services de soins obstétricaux et néonataux d'urgence. Les résultats ont montré que les coûts estimés de la modernisation d'un centre de santé pour fournir des services complets de soins obstétricaux et néonataux d'urgence étaient de 256 650 \$ (USD) pour l'infrastructure et l'équipement, 4 463 \$ par personne pour la mise à niveau des compétences en soins obstétricaux et néonataux d'urgence complets ou en anesthésie pour trois mois et 43 500 \$ par an pour les médicaments et les fournitures. Le coût total de toutes les composantes par centre de santé a été estimé à 560 802 \$. La mise à l'échelle a nécessité de nombreuses stratégies complémentaires à tous les niveaux du système de santé. L'extension des services complets de soins obstétricaux et néonataux d'urgence dans les centres de santé des zones mal desservies est faisable et urgente dans les pays à ressources limitées. (*Afr J Reprod Health 2021; 25[3s]: 84-91*).

Mots-clés: Exigences pour la CEMONU, coûts de la CEMONU, centre de santé, mise à l'échelle de la CEMONU, Tanzanie

Introduction

Improving the availability and access to emergency obstetric and neonatal care (CEmONC) services is one of the known high impact interventions for reducing maternal and neonatal mortality¹⁻³. CEmONC is the ability of the health facility to administer parenteral antibiotics, uterotonic agents and anti-convulsants, perform assisted vaginal

delivery, manual removal of the placenta, retained products, newborn resuscitation, Caesarian sections and blood transfusions¹. In 2015 the government of Tanzania developed the National Roadmap Strategic Plan to improve reproductive, maternal, newborn, child and adolescents health in Tanzania (2016 – 2020) and targeted to increase the number of public health centres (HCs) providing comprehensive emergency obstetric and neonatal

care (CEmONC) services from 12% in 2015 to 50% by 2020⁴. In 2015 there were 513 public health centres in the country and the total number required by 2019 was 3,956^{5,6}. Despite the plan to increase the number of health centres, essential components and cost of upgrading health centres to provide CEmONC services were not known and have not been reported in literature.

The increased demand for upgrading health centres in underserved areas targeting maternal and newborn health fuel demand for a costed CEmONC resource package^{4,7}. The Accessing Safe Deliveries in Tanzania (ASDIT), one of the projects supported by the Innovating for Maternal and Child Health in Africa (IMCHA) Initiative, was designed to identify the requirements and costs of scaling up comprehensive emergency obstetric and neonatal care in Tanzania by studying its implementation in selected health centres. This paper presents the costs of the major and essential components of a resource package and processes necessary for scaling up of CEmONC services delivery at the health centre level⁸. The components represent the six WHO building blocks: 1) leadership, management, governance and accountability, 2) human resources for health, 3) health financing, 4) supply chain system including infrastructure, 5) health management information system (HMIS) and 6) provision of quality health services.

Methods

Study setting and design

The health system in Tanzania has a decentralized pyramid structure. From bottom to top, the hierarchy of health facilities includes dispensaries, health centres, district hospitals, regional hospitals, zonal hospitals and the national hospital (Figure 1). All facilities from the health centre level up are required to provide CEmONC services. This was a five-year (2016 – 2020) implementation study of five HCs that encompass the diversity of HCs in Tanzania, i.e., public funding alone and joint funding with faith-based organizations and non-governmental organizations. This study used a mixed-methods approach to identify and determine essential components of a resource package and associated costs for scaling up comprehensive emergency obstetric and neonatal care services in Tanzania.

CEmONC costs for health centres

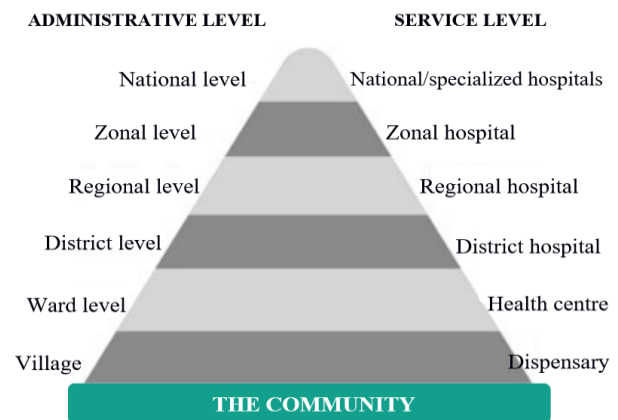


Figure 1: Hierarchy of health services provided in Tanzania

Data collection

Identification of essential components of a CEmONC resource package

The project team identified essential components for CEmONC through lessons learned from CEmONC implementation at its intervention HCs. The team conducted quarterly supportive supervisions, onsite mentorship, and regular stakeholders' meetings. The Tanzanian project team included three obstetricians, a paediatrician, an anaesthetist and a public health specialist. Data on essential components obtained through lessons learned from CEmONC implementation at its intervention HCs were collected during site visits using software developed for the project and residing on tablets. Stakeholders meetings involved health managers (heads of the project supported health centres, district and regional medical officers) and decision makers (district executive directors, regional and district commissioners). These meetings were conducted to discuss and understand health system policies, barriers and opportunities for scale up. Notes from stakeholders meetings were collected and included in the reports. Additional information on the most effective and feasible components of a resource package were obtained through the qualitative study, review of documents, reports, policies and guidelines.

Costs of major components of a CEmONC resource package

The costs for essential infrastructure, capital/medical equipment and consumable and

non-consumable pharmaceuticals for CEmONC services provision were collected from the intervention and control HCs, and Tanzania Medical Store Department (MSD) website. The actual costs of construction and rehabilitation of HCs were obtained from non-governmental organizations (Lions Club International and Thamini Uhai) and district councils that had upgraded HCs for CEmONC services provision. The team collected data on the requirements and costs of human resource for health staffing levels and staff skill mix, training costs in CEmONC, anaesthesia, and leadership and managerial capacity strengthening, supportive supervision, mentorship, and costs needed for an efficient financial management and continued deliverance of services. The costs for an efficient and effective Health Management Information System and for advocacy, community sensitization & participation were also collected.

CEmONC curriculum

The three-month CEmONC course for HC professionals developed at the Tanzanian Training Centre for International Health (TTCIH) was adopted and revised to ensure that Assistant Medical Officers (AMOs) and nurse-midwives could deliver CEmONC services safely. Forty two associate clinicians from five intervention HCs were trained in teams in CEmONC and anaesthesia. Post-training quarterly supportive supervision, mentorship, tele-consultation and an eLearning platform were implemented to reinforce skills.

Scale up of CEmONC services

The processes and content necessary to ensure engagement of stakeholders and evidence-informed policies for scaling up CEmONC included regular sharing of key findings with the key stakeholders from 2015 to 2021. This included face-to-face meetings, reports, fact sheets and policy briefs and the strategic interventions of the Co-PI decision maker (GM) and the East Africa – Health Policy and Research Organization (HPRO-EA) with high-level health system policy personnel and politicians. Local newspapers and television broadcasts were also engaged to communicate the key findings. The target audience included community members, health managers at the Council Management Health Teams (CHMT) and

Regional Health Management Team (RHMT), academics, support partners, and policy makers at the district, regional and line ministries i.e. the Ministry of Health Community Development Gender Elderly and Children (MOHCDGEC) and President's Office for Regional Administration and Local Government (PORLAG). Continuous monitoring and evaluation (M&E) enabled assessment of quality and impact of the interventions and their deployment, by intermittently reviewing progress, identifying problems in planning and/or implementation stage and making adjustments that were likely to “make a difference”. To ensure research uptake by key stakeholders, the research team insured that this intervention was consistent with national plans.

Data analysis

Qualitative data on essential components for CEmONC implementation were analyzed by identifying meaningful units and then organizing and summarizing these units into the following categories: leadership & management, human resources for health, health financing, infrastructure, the supply chain system, health management information system, quality of health services, advocacy, community sensitization & participation. Quantitative cost data were managed and analyzed using Microsoft Excel® spreadsheets. From these data the team determined the average cost for a rehabilitated CEmONC health centre costs during the first year. Subsequent years' recurring costs were reported both as a percentage of the year one costs and actual costs all costs are in USD.

Results

Essential components of a CEmONC resource package and related costs

Various components were identified and considered essential for implementation and scaling up of CEmONC services at the health centre level in Tanzania. These components were summarized and classified using the six WHO building blocks for health systems. Capacity building in leadership, management and accountability for health managers at the health centres and district councils

Table 1: Average costs of major components of a resource package for a CEmONC health centre in Tanzania in 2020

SN	System	Sub-system	New or rehabilitated CEmONC HC costs year 1 (USD)	Subsequent years' recurrent costs in % as compared to the initial costs (USD)	Recurrent (Running) costs (USD)
1	Leadership & management	Supportive supervision & mentorship	8,700	100	8700
2	Human resource for health	Personnel emoluments - salaries - average 50 health workers	208,000	100	208,000
		CEmONC & anaesthesia training per health centre	17,852	25	3,262
3	Health financing	Training as team	4,350	10	870
4	Infrastructure, supply chain system including transport	Operating theatre	34,800	25	4,350
		Maternity block/ Waiting home	87,000	1	870
		Other buildings (including staff houses, mortuary and laboratory)	52,200	1	522
		Equipment: theatre/general	43,500	100	43,500
		Medicines/reagents	43,500	100	43,500
		Ambulance - 4WD	34,800	5	1,740
		Water supply/electricity	4,350	100	4,350
5	HMIS	Training plus HMIS supplies	4,350	10	435
6	Quality health services	Training plus equipment	8,700	10	870
7	Advocacy, community sensitization & participation	Community health workers, Public address equipment & mobilization	8,700	10	870
Total Estimated Costs/ per upgraded CEmONC health centre			560,802	57	321,839

coupled with supportive supervision, coaching and mentorship fueled implementation of CEmONC services. The estimated annual recurrent costs for the block on leadership, management, governance and accountability components was \$8,700.

Presence of care providers skilled in CEmONC and anaesthesia was key for introduction and maintenance of CEmONC services. The training cost for four care providers in CEmONC and anaesthesia per facility was \$17,852 and \$208,000 for human resource recurrent costs for a well-staffed health centre with an average of 50 health care providers according to the revised Ministry of Health, Community Development Gender, Elderly and Children staffing levels 2014 – 2019⁹. In this project, from each health centre two advanced associate clinicians (assistant medical officers) were trained in CEmONC and two associate clinicians (clinical officers/nurse-midwives) in anaesthesia. Costs of the program conducted at TTCIH in Ifakara for three months

averaged \$4,463 per-head in 2010 and 2011. The biggest portions of costs went to meals (24%), accommodation (22%), out of pocket allowance for participants (18%), and facilitation allowance (17%).

During supportive supervision visits at the health centres, the project team identified skills-gaps in financial management and how those affected implementation of CEmONC services. It was found that, in the context of Direct Health Facility Financing, the health facility management teams required skills for optimal management of facility funds. The government of Tanzania has just embarked on a fiscal decentralization through directing health facility financing to primary healthcare providers, with the aim of granting autonomy to these providers in the planning, management and use of funds. The annual training cost on basic book-keeping in order to be able to monitor and control funds was estimated at \$4,350 during the initial training and \$870 for skills

refreshing in subsequent years. The essential new infrastructure (additional) and supply chain system for CEmONC included operating theatre (\$14,800) and maternity block (\$87,000), other buildings (laboratory and 3 staff houses estimated at \$52,200), medical equipment (\$43,500 per year), medicines/reagents (\$43,500 per year), water and sanitation plus electricity (\$4,350 per year) and a 4WD ambulance (\$34,800).

During project implementation the project team substantiated the significance of the collecting and managing the health service delivery information for informed decision-making during planning, implementation and evaluation of CEmONC services. The initial costs for training of staff on HMIS data collection and reporting to enhance data utilization at base was estimated at \$4,350 with a subsequent annual cost of \$870. In order to provide equitable and quality health services adhering to management guidelines, standard operating procedures, infection prevention and control (IPC), the five S Kaizen management approach was used. This cost an estimated \$8,700. Advocacy, community mobilization and participation were identified as essential components for CEmONC implementation and maintenance. The annual costs for maintenance of community health workers, public address system equipment for mass campaigns and costs for maintaining transparency of annual plans & budgets, receipts and availability of medicines and periodic income and expenditure reports including client feedback mechanisms were estimated at \$8,700.

The costs of medicines, reagents, and medical equipment are \$87,000 per annum. Total construction cost for upgrading infrastructure for a HC (building for operating theatre, maternity block and other buildings) to be CEmONC ready was estimated at \$174,000. The estimated total cost of upgrading a HC to deliver CemONC is \$560,802 with an estimated yearly recurring cost of 321,839.

Scaling up of CEmONC services at HC level

Continuous implementation of knowledge translation strategies resulted in uptake of the curriculum for CEmONC training and improvement of the curriculum for anaesthesia from three to six months. Between 2015 and 2019,

a total of 350 health centers and 69 district council hospitals were either renovated or constructed and equipped by the government to offer safe surgery services including CEmONC services⁵.

Discussion

Essential components of a CEmONC resource package

Similar to other studies, this study indicated that introduction and sustenance of CEmONC entail all six WHO building blocks of the health systems^{10,11}. Leadership, management and governance were found as key for CEmONC implementation and scale up. These include supportive supervision, coaching and mentorship. There is evidence that strong leadership at facility and higher levels is one of the key health systems factors affecting the performance in maternal and child health services^{3, 12, 13}. Good leadership and management are associated with appropriate mobilization, organization and utilization resources that are needed for introduction and sustainability of CEmONC services. Lessons learnt from the ASDIT project show that frontline health facilities need changes – need managers who can create and drive changes. In order to have a successful implementation of CEmONC services at health centre level there is need to build leadership and managerial competences at the facility levels to enhance accountability and productivity. Human Resources for Health was also critical for provision of health care services. In this study the health workforce was one of the key determinants of implementation of CEmONC services at the health centre level. Having the right staff skill mix is important and appropriate HRH management including “workload indicators for staffing needs” (WISN) needs to be deployed for effective workforce distribution and sustainable service provision^{14,15}.

Adequate and effective health financing is another important factor for sustainable provision and utilization of maternal and child health care services¹⁶. Our findings indicated that in the context of the Direct Health Facility Financing System in Tanzania whereby the government allocates and disburses funds directly to the health facility bank

account, it is essential to build local staff capacity on basic bookkeeping in order to be able to control funds at their disposal as well as provision of periodic financial reports. This can enhance a more robust accounting management system that is able to control all financing sources as well as expenditure.

Equipped infrastructure was also an essential component for implementing CEmONC services¹¹. Essential infrastructure for CEmONC implementation included the ante-, intra- and postpartum wards, operating theatre, laboratory with blood transfusion facilities, laundry and staff houses, an ambulance and a standby generator. Findings indicated also that continuous provision of CEmONC requires constant supply of essential pharmaceutical supplies. Evidence indicate that attendance at delivery by skilled personnel equipped with appropriate supplies and equipment is strongly associated with reduction of maternal mortality than many other interventions¹⁷. Health management information system and quality health services were other essential components for CEmONC implementation and sustainability. The Health Management Information System is crucial for evidence-based policy-making, informed decision-making during planning, implementation and evaluation of health programs; and for appropriate use of resources at all levels of the health system¹⁸. Because of the decentralization of human and financial resources in Tanzania, information is needed at the frontline facility to track progress and quality of services delivery. Strengthening service delivery is crucial to the achievement of implementation of CEmONC services. Ensuring availability of CEmONC services that meet a minimum quality standard and securing access to women are key functions of a health system¹⁹. Provision of quality CEmONC adhering to national management guidelines should be ensured.

The costs of major components of the CEmONC resource package

The total estimated cost for upgrading a health centre for provision of CEmONC services was \$560,802 and the highest recurring costs were for human resources, about \$208,000 per year for a well-staffed HC with 50 health care providers¹⁴.

Other studies in Tanzania indicated that a completely new HC would require an estimated additional \$434,700 investment on mobilization, infrastructure and initial manpower deployment costs⁵. Costs to upgrade and maintain CEmONC-ready HCs are within the expenditure limits of the Tanzanian government. The \$4,463 cost of the training program is a fraction of the cost of upgrading and maintaining a CEmONC-ready HC and does not present a financial barrier. However, the training program itself would have to be scaled up and offered in many more institutions in order to meet the demand of upgrading 50% of HCs to be able to deliver CEmONC services. There is also a need to strengthen basic obstetric, anaesthetic and newborn care skills for associate clinicians to ensure that they have a good foundation for the three-month CEmONC training course.

Processes and content necessary for scaling up of CEmONC services at HC level

To ensure uptake by policymakers, the research team worked closely with them throughout the duration of the project. The CEmONC project was relevant to the National Road Map that aimed at having 50% of all public HCs offering CEmONC by 2020 and has helped elucidate some of the strategies, opportunities and challenges in meeting that goal. The strategic engagement of a public health decision maker as a co-Principal Investigator (GM) ensured frequent meetings with decision and policymakers at the community, district and regional levels and periodic meetings with national policymakers. This led to early uptake of the training curricula and scale up of CEmONC services at the regional and national levels. Having the right contacts to discuss right messages at the right time with decision and policy makers led to adoption and ongoing support of strategies to improve CEmONC services.

Ethical considerations

Ethics approval was granted by the National Institute for Medical Research (NIMR) of Tanzania with Ref. No. NIMR/HQ/R.8a/Vol.IX/1986, the Tanzania Commission for Science and Technology (COSTECH) with Ref. No. CST/ AD.69/227/2015 and from the Dalhousie Research Ethics Boards.

Permission to conduct the study was obtained from the offices of the Morogoro Regional Medical Officers and respective District Medical Officers.

Limitations

This study focused solely on the costs of an essential package for CEmONC services delivery in Tanzania and did not link these costs to treatment outcomes. The cost estimates for consumables depend on volume and will likely be different from our estimates for each health centre. We also calculated costs for CEmONC additional infrastructure and the personnel remuneration for a typical health centre with 50 health care providers per facility, a number that can vary by region and country. Use of workload indicators of staffing need is strongly recommended for objective distribution of available health workforce.

Conclusion

This paper indicates that CEmONC services can be introduced at HC level in underserved areas in resources limited settings using available human and material resources. The costs of essential components required for CEmONC implementation are feasible in countries with similar constraints to Tanzania on health system resources. The costs and strategies of CEmONC implementation presented here can serve as a guide to other jurisdictions in their quest to reduce maternal and perinatal mortality.

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Contribution of authors

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