

RE-VISIONING EMERGENCY OBSTETRIC AND NEONATAL CARE

THE MALAWI STUDY REPORT, 2023



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EXECUTIVE SUMMARY

Type of Research Study: This study utilized a qualitative approach and employed Human-Centered Design (HCD) methodologies.

Background: Globally, maternal mortality remains unacceptably high, with approximately 295,000 women succumbing to pregnancy or childbirth-related complications daily (WHO, UNICEF, UNFPA, Group, & Division, 2019). Many of these complications are preventable and treatable through high-quality Emergency Obstetric and Newborn Care (EmONC). EmONC's critical role in managing direct obstetric complications and enhancing maternal survival is underscored by global health experts (UNFPA, UNICEF, & Mailman School of Public Health, 2009). However, since 2009, there have been significant changes in health systems worldwide, expansion of the maternal and newborn health evidence base, and the accumulation of valuable implementation experiences. These developments prompted the need to update, enhance, and expand the EmONC framework and indicators to better address the evolving needs of countries, including the integration of newborn care. Thus, the Re-Visioning EmONC Project was initiated to review, rethink, and revise this framework and indicator set.

Study Objectives: The primary goal of this study was to gather insights, guidance and recommendations from EmONC health providers, district and national planners, and other key stakeholders in Malawi on how to enhance the existing global EmONC framework and indicators. Specific objectives were to:

1. Assess planners' and implementer's experiences.
2. Explore the previous experiences of planners and implementers using the current EmONC framework and indicators.
3. Examine opportunities for improving the EmONC framework and indicators.
4. Collect additional stakeholder's views information that is needed to enhance the monitoring of the health systems to provide high-quality EmONC in Malawi

5. Capacity to provide high-quality EmONC in from participants on proposed revisions and additions to the framework and indicators, as suggested by the global Re-Visioning EmONC initiative.

Methodology: In this qualitative study, we employed Human-Centered design (HCD) approaches to collect insights effectively. To begin, we utilized purposive sampling to choose three districts in Malawi, each featuring a comprehensive EmONC (CEMONC) and two basics of contextual in-depth interview and 10 focused group discussion EmONC, (BEMONC) facilities (FGDs). In these interactions, we applied various HCD techniques, including journey maps, collage systems maps, sliders templates.

Using the “Malawi Emergency Obstetric and Newborn Care Assessment, 2020” (Ministry of Health), the research team reviewed EmONC signal function performance by zone and by district. Our particular interest was in exploring why health centers find it challenging to perform four EmONC signal functions: parenteral anticonvulsants, manual removal of placenta, removal of retained products and assisted vaginal delivery (Table 3). We gathered data through a combination of 10 contextual.

We took a collaborative approach to the analysis process to minimize individual biases. Two researchers input the data into Miro. Thereafter, all four researchers worked together to synthesize the data. This collaborative effort was shared with the global team members during our weekly meetings. We utilized affinity diagramming to identify initial themes within the Miro platform. These preliminary themes served as the foundation for creating the code book, which was instrumental in our subsequent analysis.

The contextual interviews involved engaging with local EmONC experts, while the FGDs included stakeholders who are actively involved in EmONC service provision and performance monitoring. The data analysis was a continuous and iterative process, carried out by a team of researchers. We facilitated this process by using NVivo 14 software to aid in our analysis.

Study Findings: A total of 74 individuals participated in the study, either through contextual interviews (n=10) or FGDs (n=64). Results from contextual interviews revealed that planners use indicators to design EmONC services, assess performance, monitor maternal and newborn health progress, and identify gaps for intervention. Implementers at the service delivery level employ these indicators to guide their practice, particularly in managing direct obstetric complications. Findings from both contextual interviews and FGDs suggested that expanding the number of neonatal signal functions and introducing a third level of care could improve the EmONC framework. Participants also proposed additional indicators for adoption.

The study uncovered several insights that can enhance the monitoring of the health system for the delivery of high-quality EmONC services in Malawi. These insights highlight the challenges associated with the referral system from BEMONC to CEMONC facilities, emphasizing the need for operational support, efficient communication, and transportation. Additionally, health workers face risks and hazards in the referral process, impacting the well-being of women, neonates, midwives, and ambulance drivers. Confidence levels among health workers were linked to specific signal functions, indicating the need for adequate training and support. Furthermore, unbalanced staff-patient ratios in BEMONC facilities led to increased workload, stress, and a negative impact on job satisfaction. The lack of infrastructure, essential equipment, medications, and supplies in handling obstetric and neonatal complications was identified as a significant barrier to reducing maternal and neonatal mortality rates.

Conclusion: This study has contributed valuable insights to the global revisioning of the EmONC framework and indicators. It highlights the importance of addressing challenges related to the referral system, infrastructure, staffing, and confidence levels among health workers in providing EmONC services. These findings are essential for improving maternal and neonatal services in Malawi and beyond.

CONTEXTUAL BACKGROUND

In this section, we provide the key aspects of Malawi's geography, population, and economic status. We also examine the healthcare delivery system and discuss the state of maternal health in both the local context of Malawi and its global significance. We conclude with an overview of the Malawi Re-visioning EmONC study and its contextual background.

GEOGRAPHY AND ADMINISTRATION

Malawi, a landlocked country in Southern Africa, shares its borders with Mozambique, Zambia, and Tanzania. The nation is divided into three main regions: The Northern, Central, and Southern Regions, comprising a total of 28 districts. There are 6 districts in the North, 9 in the Center, and 13 in the South, as depicted in Figure 1. In terms of administrative subdivisions, the districts are further segmented into Traditional Authorities (TAs), which, in turn, consist of villages, serving as the smallest administrative units in the country's governance structure (National Statistics Office, 2018).

Geographically, Malawi spans about 901 kilometers in length and varies in width from 80 kilometers to 161 kilometers, resulting in a total surface area of 118,484 square kilometers, of which approximately 94,276 square kilometers are land. An outstanding geographical feature is Lake Malawi, an extensive water body extending about 475 kilometers along Malawi's eastern boundary, adjacent to Mozambique (National Statistics Office, 2018).

Malawi experiences a tropical continental climate with maritime influences, resulting in diverse weather patterns influenced by altitude and proximity to Lake Malawi. The period from May to August is characterized by cold and dry conditions, while from September to November, the weather becomes notably hot. The rainy season

commences in November and persists until April. Geographically, the terrain is primarily low, featuring scattered small hills across the country. Accessibility to most villages is maintained throughout the year, thanks to a network of tarmac and earth roads overseen by the Ministry of Transport and Public Works through the National Roads Authority.

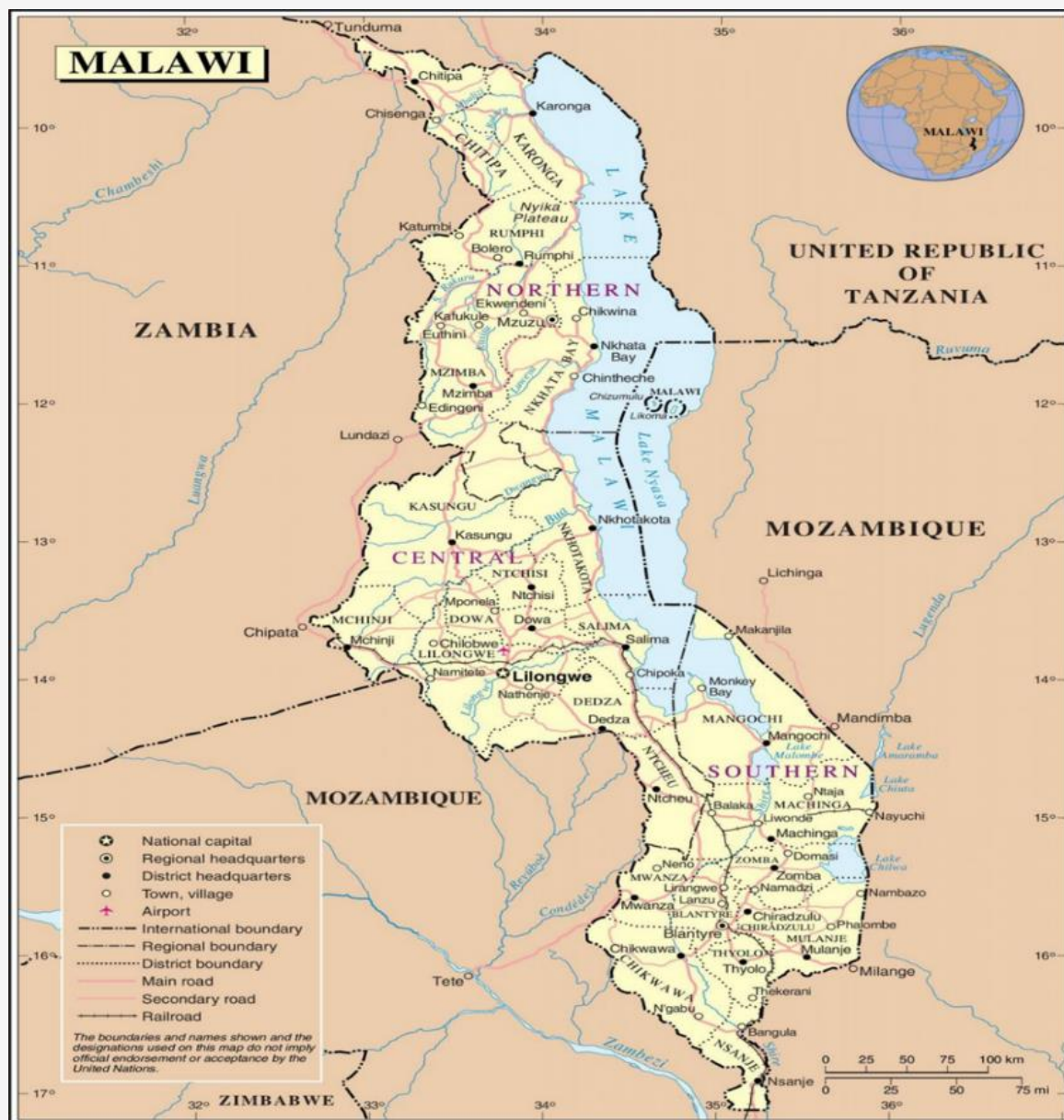


Figure. 1: Map of Malawi showing administrative districts

Malawi's demographic profile in 2020 showed an estimated population of 18.4 million people. The sex ratio at the national level in 2018 was reported as 94.2 males for every 100

females. Among this population, 45% fell within the reproductive age range of 15 to 49 years, while 19% were aged 15 to 24 years, classified as youths. Additionally, 23% of the population consisted of adolescents aged 10 to 19 years. This demographic information suggests a significant population increase, more than doubling over a span of 33 years, from 8 million in 1987. It is also worth mentioning that childbearing in Malawi starts quite early with a mean age of 19 years at first childbirth (Malawi 2015-16 Demographic and healthy survey).

Malawi has experienced increased urbanization from 8% in 1977 to 15% in 2008, which has a great impact on the social services including health. By 2018, the proportion of Malawi's population residing in urban areas was estimated to be at 16% in 2018 (National Statistics Office, 2018).

SOCIAL-ECONOMIC SITUATION

Malawi remains one of the least developed countries in the world. Its estimated population in 2022 was 20.41 million, with an annual growth rate of 2.6%. Despite its enduring efforts to implement substantial economic and structural reforms aimed at fostering sustainable economic growth, Malawi struggles with the obvious reality of being one of the world's most underprivileged nations. The country's economic foundation heavily relies on agriculture, which serves as the primary source of livelihood for over 80% of its population. The strong reliance on agriculture makes Malawi particularly vulnerable to external disruptions, especially those related to climate (World Bank).

In January 2021, the Malawi Government unveiled the ambitious Malawi 2063 Agenda, with the goal of transforming the nation into a prosperous, self-reliant, industrialized upper-middle-income country. This transformative vision emphasizes key pillars, including the commercialization of agriculture, industrialization, and urbanization. The initial phase of this vision encompasses a 10-year implementation plan closely aligned

with the World Bank's Country Partnership Framework (CPF) for the period spanning 2021 to 2025 (Malawi Planning Commission 2020).

However, despite these efforts, Malawi's economy continues to face significant challenges, characterized by frequent external shocks and macro-fiscal imbalances. While growth is projected to increase in 2023, reaching 1.6% as improvements in electricity supply are realized (compared to 0.9% in 2022), the nation struggles with persistent foreign exchange shortages that dampen growth prospects. There are expectations of securing a staff-level agreement with the International Monetary Fund (IMF) and returning to an Extended Credit Facility by the end of 2023. Looking ahead, the economy is forecast to grow at 2.8% in 2024, supported by anticipated macroeconomic reforms. However, this growth remains insufficient to substantially alleviate the prevalent high levels of poverty.

Following the impact of Tropical Cyclone Freddy in early, agriculture output has experienced only marginal growth from the previous year. Inflation rates remain high, standing at 28.4% in July 2023, with food prices surging rapidly, reaching 39.3% year-on-year in July 2023, primarily driven by supply constraints. To counter inflationary pressures, the policy rate was increased from 14% to 24%. As interest rates rise, the fiscal burden of debt service has increased. While foreign exchange reserves have shown a modest improvement, they remain low at just 0.7 months of import cover as of July 2023. Recurring climate shocks pose a significant risk, exacerbating food supply shortages in Malawi. Coupled with persistent inflation, rising domestic prices, and an anticipated decline in per capita income, it is projected that the percentage of individuals subsisting on less than \$2.15 per day (2017 PPP) will increase from 71% to 72% in 2023 (World Bank, 2023).

MALAWI HEALTH CARE DELIVERY SYSTEM SURVEY

Healthcare services in Malawi are predominantly provided through three key entities. The government, which is represented by the Ministry of Health (MOH), contributes

approximately 60% of these services. The Christian Health Association of Malawi (CHAM) contributes about 39%, while the private-for-profit health sector makes a more modest contribution of approximately 1%.

Malawi's healthcare system is structured into three levels: primary, secondary, and tertiary. At the primary level, healthcare is available through rural hospitals, health centers, health posts, outreach clinics, and community health initiatives. To complement primary healthcare, secondary level services are provided at district and CHAM hospitals, while central hospitals serve as the highest tier, offering tertiary and specialized medical services (National Statistics Office, 2018). All maternity-related services in Malawi are offered free of charge in government healthcare facilities. Recently, service agreements between the government and CHAM have extended this provision to include free maternity services in CHAM facilities as well.

Health care resources in Malawi are unevenly distributed. Only 46% of the population has access to a formal health facility within a 5 km radius, and only 20% of the population lives within 25 km of a hospital. Access is worse in rural areas. There is a particularly significant unequal distribution of health personnel, which favors urban areas, secondary level and tertiary level of care. On the whole, the total number of professional Health Care Workers (HCWs) increased by 53% from 5,453 in 2004 to 8,369 in 2010; the capacity of health training institutions increased across a range of programs; and staff retention improved, among other things. However, only four of the 11 priority cadres (clinical officers, environmental health officers, radiology and laboratory technicians) met or exceeded their targets as set in the original EHRP design. Despite an investment of \$53 million during the EHRP on pre-service training capacity, annual output of nurses increased by only 22% and shortage of health workers remains a big challenge in the health system (National Statistics Office, 2018).

Malawi's health system is grossly under-resourced. Per capita expenditure is about US\$12, which is inadequate for delivery of basic primary health care. In 2002, an extensive exercise

to determine the cost of delivering an "Essential Health Package" (EHP) of well-proven and cost-effective health services that would deal with the main burden of disease, found the appropriate amount to be US\$ 17.53 per capita per year.

INTRODUCTION TO THE STUDY

Maternal mortality is still unacceptably high worldwide. About 295,000 women die from pregnancy or childbirth-related complications around the world every day (WHO et al., 2019). Most of these deaths (94%) occur in low-resource settings, and most of them can be prevented. The levels of maternal mortality differ significantly among the major regions of the developing world. Sub-Saharan Africa and Southern Asia accounted for approximately 86% (254 000) of the estimated global maternal deaths in 2017. Sub-Saharan Africa alone accounts for roughly two-thirds of maternal deaths, while Southern Asia accounts for nearly one-fifth. Despite its very high maternal mortality rate (MMR) in 2017, sub-Saharan Africa also achieved a substantial reduction in MMR of nearly 40% since 2000. Overall, the maternal mortality ratio (MMR) in less-developed countries declined by just under 50% (WHO et al., 2019). Though progress in reducing the MMR is undeniable, this decline is not enough to meet the ambitious target Sustainable Development Goal, Target number 3 which includes: "reducing the global MMR to less than 70 per 100 000 births, with no country having a maternal mortality rate of more than twice the global average" (United Nations, 2015). Many women are still dying either during pregnancy or from childbirth-related complications. Global figures hide huge disparities between and within countries and developing regions still account for most of these deaths where the MMR is about fourteen times higher than in the developed regions (WHO et al., 2019).

Malawi's maternal mortality, currently estimated at 439/100,000 live births (National Statistical Office, 2017), poses a significant public health challenge. However, the country has made steady progress in improving maternal health and maternal mortality. For example, in 2004, the maternal mortality ratio was estimated to be more than double what it was in 2017 at 984 per 100,000 live births (National Statistical Office, 2017). Much as

there has been progress, the indicator is still unacceptably high and does not meet the Sustainable Development Goal target to reduce the global maternal mortality ratio to less than 70 percent per 100,000 live births. Reducing maternal mortality is at the top of health and development agendas. Therefore, the country needs to strengthen and scale-up good clinical practices in order to achieve the targets with respect to maternal health.

Women die of obstetric complications during and following pregnancy and childbirth. Some of these complications are preventable and most of them are treatable with good-quality emergency obstetric and newborn care (EmONC). Other complications may exist before pregnancy but are worsened during pregnancy, especially if not managed as part of the woman's care. The major complications that account for 80% of all maternal deaths are excessive bleeding (mostly after childbirth) (21%), unsafe abortion (13%), preeclampsia and eclampsia (12%), sepsis (8%), and obstructed labour (8%). The rest of the deaths are caused by diseases such as malaria and acquired immuno-deficiency syndrome (AIDS) during pregnancy (Say et al., 2014).

Similarly, evidence in Malawi suggests haemorrhage, severe preeclampsia/eclampsia, and postpartum sepsis as major causes of maternal deaths (Malawi Ministry of Health & UNICEF, 2021). To improve maternal health, barriers that limit access to quality maternal health services must be identified and addressed at both health system and societal levels. Over time, several strategies have been redefined and new approaches adopted to address the problem of maternal and neonatal mortality. Interventions have focused on reducing the time between onset of a pregnancy complication and delay in decision to seek care, delay in arriving at a health facility or delay in receiving care. Global health experts have identified signal functions for EmONC as representative of the most effective medical intervention for managing direct obstetric complications and improving maternal survival (World Health Organization et al., 2009). This requires availability of adequate drugs, supplies, equipment, infrastructure, and trained staff to competently diagnose and treat complications in equitably distributed health facilities that cater to the needs of populations.

The 1997 Guidelines for monitoring the availability and use of obstetric services describe a set of connected indicators to measure and monitor the availability, utilization, and quality of emergency obstetric care in low- and middle-income countries (LMICs) (UNICEF, WHO, & UNFPA, 1997). This framework, built around signal functions and the designation of basic and comprehensive levels of EmOC (Table 2), has been enormously influential over the last 30 years. It is now found in virtually all LMIC health plans for maternal and newborn health (MNH), and often forms the basis for planning around human resources, infrastructure, equipment, supplies, transport, and referral related to care during childbirth. However, much has changed in health systems and the MNH landscape in the last 30 years.

Table 1: Signal Functions

Basic EmOC signal Functions	Comprehensive EmOC Signal Functions
Administer parenteral antibiotics	1, Administer parenteral antibiotics
Administer parenteral uterotonics (e.g., Oxytocin)	2, Administer parenteral uterotonics (e.g., Oxytocin)
Administer parenteral anticonvulsants e.g., magnesium sulphate	3, Administer parenteral anticonvulsants e.g., magnesium sulphate
Perform manual removal of placenta	4, Perform manual removal of placenta
Perform removal of retained products e.g., MVA, D&C	5, Perform removal of retained products (e.g., MVA, D&C)
Perform assisted vaginal delivery (e.g., vacuum extraction or forceps delivery)	6, Perform assisted vaginal delivery (e.g., vacuum extraction or forceps delivery)
Perform neonatal resuscitation (e.g., with bag and mask)	7, Perform neonatal resuscitation (e.g., with bag and mask)
	8, Perform surgery (e.g., caesarean section)
	9, Perform blood transfusion

The EmONC signa functions (Table 1) and the indicators (Table 2) were updated once in 2009, when The Averting Maternal Mortality and Morbidity (AMDD) and United Nations (UN) agencies (UNFPA, UNICEF & WHO), published Monitoring emergency obstetric care: A Handbook.

Table 2: Current EmONC Indicators

INDICATOR	ACCEPTABLE LEVEL
Availability of EmONC: basic & comprehensive facilities	At least 5 EmOC facilities (including at least 1 comprehensive facility) for every 500,000 population
Geographic distribution of EmONC facilities	All subnational areas have at least 5 EmONC facilities (including at least 1 comprehensive facility) for every 500,00 population
Proportion of all births in EmONC facilities	Minimum acceptable level to be set locally
Met need for EmONC proportion of women with major direct obstetric complications who are treated in EmOC facilities	100% of women estimated to have major direct obstetric complications are treated in EmOC facilities.
Caesarean sections as a proportion of all births	The estimated proportion of births by caesarean section in the populations is not less than 5% or more than 15%
Direct obstetric case fatality	The case fatality rate among women with direct obstetric complications in EmONC facilities is less than 1%
Intrapartum and very early neonatal death rate	Standards to be determined
Proportion of maternal deaths due to indirect causes in EmONC facilities	No standard can be set

But since 2009, country health systems have evolved, the MNH evidence-base has expanded, and a wealth of implementation lessons have been collected about what works and what remains challenging across the different settings.

With these developments, it was apparent that the EmONC framework and indicators needed to be updated, improved, and in some cases expanded to better meet the needs of countries. This included the full integration of newborn care. The Re-Visioning EmONC Project is a new initiative to review, rethink, and revise the framework and was led by AMDD (Columbia University), UNFPA, UNICEF, WHO and the London School of Hygiene and Tropical Medicine.

Critical to the success of the Re-Visioning process was learning directly from countries about their experiences conducting EmONC assessments and using the EmONC framework and indicators to plan, implement and monitor EmONC services. Malawi is one of the countries which participated in the initiative and conducted an in-depth study using Human-Centered Design (HCD) throughout the process. Using Human Centered Design (HCD) helped to ensure that the initiative incorporated ideas for improvement that came directly from national policy makers and implementers who have used the current EmONC framework and indicators, as well as from others who would benefit from this information, but do not yet routinely use the indicators. It also ensured that countries' experiences are captured and that revisions reflected their evolving needs (Melles, 2021).

Malawi was considered for inclusion in this study because it completed at least three EmONC assessments. The country has conducted 4 EmONC assessments and has acquired vast experience and lessons from implementing EmONC.

OBJECTIVES OF THE STUDY

MAIN OBJECTIVES

The main objective of the study is to gather information and recommendations from EmONC health providers, district and national planners and other key stakeholders in Malawi on how to update and improve the current global EmONC framework and EmONC indicators (and guidance). Recommendations from Malawi will be incorporated into the global Re-Visioning EmONC initiative coordinated by Columbia University, the London School of Hygiene & Tropical Medicine, WHO, UNFPA and UNICEF.

Assess planners' experiences.

Assess planners and implementers' experiences of using the current EmONC framework and EmONC indicators and gather specific technical feedback on how they can be improved.

Generate Insights and recommendations.

Generate insights and recommendations on how the EmONC framework and indicators can be improved.

Collect additional Stakeholder's views.

Collect stakeholders' ideas of what additional information needs to be collected in order to monitor the functioning of health system and its ability to effectively deliver good quality EmONC in Malawi.

Gather feedback on Proposed revisions.

Gather feedback on proposed revisions and additions to the framework and indicators being suggested by the global Re-Visioning EmONC initiative.

METHODS

Type of study

Qualitative and Human Centred Design (HCD) methods were used to guide the study. HCD focuses on human behavior with contextual nuance providing new insights and opportunities for improving existing interventions, or for innovating novel solutions. The HCD approach helped to elicit information which can sometimes be hard to capture using direct questions, to speak new ideas and opportunities for revising the indicators and to stimulate feedback on proposed changes to the framework and interactive nature, HCD facilitated co-designing with the service providers, local experts and system actors who took an active role in identifying needs, developing and further refining the interventions.

Table 3: EmONC signal function performance, by type of health facility

	Total number of facilities that do deliveries (n)	EmONC Signal Functions							
		Parenteral Antibiotics	Parenteral Oxytocics	Parenteral Anticonvulsants	Manual Removal of Placenta	Removal of Retained Products	Assisted Vaginal Delivery	Blood Transfusion (n=98) *	Surgery / Caesarean (n=98) *
Central Hospital	4	100	100	100	100	100	100	100	100
District Hospital	23	100	100	100	91	100	96	100	100
Rural/Community Hospitals	52	96	98	85	60	85	52	63	42
Other hospitals	19	95	100	89	68	79	68	84	89

Health Centre	382	81	98	53	43	29	18	NA	NA
Maternity Units	2	100	100	50	100	0	0	NA	NA

The team selected Mzimba south from the northern zone, Ntchisi from the central zone, and Thyolo from the southern zone, based on the low performance of the four signal functions of interest and in consultation with the stakeholders in the districts (as highlighted in table 4).

Furthermore, in each of the selected districts, the team purposefully selected two health centers namely: Euthini and Jenda in Mzimba South; Kangolwa and Malomo in Ntchisi ; and Bvumbwe and Thekerani in Thyolo.

Table 4: EmONC signal function performance by district

	Total number of facilities that do deliveries (n)	EmOC Signal Functions							
		Parenteral Antibiotics	Parenteral Oxytocics	Parenteral Anticonvulsants	Manual Removal of Placenta	Removal of Retained Products	Assisted Vaginal Delivery	Blood Transfusion (n=98)*	Surgery / Caesarean (n=98)*
North									
Chitipa	9	89	100	22	33	67	33	50	50
Karonga	14	71	100	50	43	50	29	50	25
Rumphi	9	100	100	33	56	22	33	50	50
Nkhata-Bay	8	63	100	25	50	75	25	100	50

	Total number of facilities that do deliveries (n)	EmOC Signal Functions							
		Parent eral Antibio tics	Parenter al Oxytocic s	Parent eral Antico nvulsa nts	Manu al Remo val of Place nta	Remo val of Retai ned Produ cts	Assist ed Vagin al Deliv ery	Blood Transfu sion (n=98)*	Surger y / Caesar ean (n=98)*
Mzimba North	18	89	100	44	44	22	17	100	100
Mzimba South	19	95	84	68	47	37	37	67	33
Likoma	1	100	100	100	100	100	0	100	100
Central									
Kasungu	23	96	100	70	35	61	26	80	60
Nkhotakota	16	81	100	50	31	44	13	60	40
Ntchisi	11	73	100	64	36	9	18	100	100
Dowa	19	95	100	58	37	32	21	100	75
Salima	15	100	100	73	33	60	13	50	50
Lilongwe	42	90	98	74	60	57	62	92	83
Mchinji	13	100	77	85	77	54	46	75	25
Dedza	25	84	100	68	48	36	28	67	67
Ntcheu	21	57	100	33	38	14	10	100	50
South									
Mangochi	30	80	100	67	60	57	30	83	83

	Total number of facilities that do deliveries (n)	EmOC Signal Functions							
		Parent eral Antibio tics	Parenter al Oxytocic s	Parent eral Antico nvulsa nts	Manu al Remo val of Place nta	Remo val of Retai ned Produ cts	Assist ed Vagin al Deliv ery	Blood Transfu sion (n=98)*	Surger y / Caesar ean (n=98)*
North									
Machinga	17	88	100	71	65	29	35	100	100
Balaka	10	100	100	90	80	70	70	100	100
Zomba	25	96	100	84	44	56	32	75	75
Phalombe	12	100	100	100	50	33	17	100	100
Mulanje	21	86	100	33	48	24	19	67	67
Chiradzulu	13	23	100	46	54	8	15	100	100
Blantyre	25	92	100	68	36	32	16	75	100
Mwanza	4	75	100	75	100	50	50	100	100
Thyolo	25	72	100	24	44	16	12	40	40
Chikwawa	16	69	88	50	81	56	6	67	100
Nsanje	13	77	100	69	38	46	15	100	67
Neno	8	100	100	88	50	25	50	100	100

The district hospitals are designated comprehensive EmONC facilities and serve as referral points for the health centers, as such, they were automatically selected for this study. The district health management team helped to sample health centers in different catchment

areas with either high or performance of the four signal functions of interest. Facilities were chosen based on their yearly caseload, specifically those with 500 or more delivery annually.

Study population

The population comprised a panel of stake holders across the system who are involved in the provision of EmONC. Participants from healthcare facilities were knowledgeable about providing BEmONC at health centers or receiving referrals at CEmONC level, while manager-level participants mainly consisted of individuals experienced in working with EmONC indicators. The selected development partner actively supported the ministry in delivering and overseeing EmONC services. These participants include:

- Registered Nurse midwives and Nurse Midwife Technicians
- Medical and Clinical Officers
- Facility and maternity in charges
- Transport officers
- Ambulance drivers
- District health management team members
- Ministry of Health programme managers and advisors
- Development partners

Sampling and sample size

Table 5: Districts and facilities selected.

<u>District</u>	<u>Facilities</u>
Mzimba	1 district hospital (CEmONC) 2 health centres designated as BEmONC
Ntchisi	1 district hospital (CEmONC) 2 health centres designated as BEmONC
Thyolo	1 district hospital (CEmONC) 2 health centres designated as BEmONC
Total	3 district hospitals 6 health centres designated as BEmONC (both well performing and poorly performing)

The information provided in table 5 represents the sample of healthcare facilities that participated in this study. The number of participants was determined using a saturation-based approach, resulting in a total sample size of 74 individuals. Out of these 74, 10 individuals participated in key informant interviews, while the remaining 64 took part in HCD workshops, which included focus group discussions and groundtruthing of the proposed indicators and signal functions. Refer to Table 6 and Table 7 for further details.

Sampling approach

Purposive sampling was used to select three districts as described in tables 5. Two BEmONC Centers affiliated to the district hospital were selected to participate in the study in consultation with the DHMT. Homogeneous groups comprising 5 to 6 people from across different districts and facilities were selected.

CeMONC Centres were selected based on low performance of signal functions as well as BEmONC Centres. At each hospital, we convened three groups of participants who had experiences with referral from BEmONC facilities.

The selection process deliberately aimed to encompass a diverse range of individuals to elicit varied perspectives. Furthermore, it sought out participants who were willing to openly discuss the topics at hand. Healthcare workers from various professional cadres (refer to table 6 and table 7) were organized into specific groups to create an environment where they felt at ease to express their thoughts and opinions.

Policy makers and program managers

Policy makers and program managers were selected based on their roles in monitoring and supporting health facilities and health professionals in the provision of EmONC. They were asked about BEmONC performance challenges, including referral to CEmONC, as well as to provide feedback on the current indicators and prototypes of new indicators.

Participants in focus groups included the following:

District Health Management Teams (DHMT) members (2 groups, one in each of the selected districts). Participants included the District Health and Social Services (DHSS) Officers, District Medical Officers (DMO), District Nursing and Midwifery Officers (DNMO), District Environment Health Officers (DEHO)

Safe Motherhood coordinators, and Hospital Administrators from each selected district. National MoH (1 group with participants from across directorates) Representatives from the following directorates: Reproductive department of Ministry of Health, Health Management Information System, Directorate of Nursing and Midwifery services, Planning Department, Healthy Management Information Systems (HMIS), Central Medical stores Development partners (1 group with participants from across partners) UNFPA, UNICEF, WHO among others).

Inclusion and exclusion criteria

Inclusion criteria

Sites included in this study were Designated EmONC facilities with low performance in four signal functions as highlighted in table 3. Facilities in both rural and urban areas High volume facilities (with more than 500 deliveries per year)

Participants included in this study were.

Qualified nurse midwives and nurse midwife technicians, clinical officers and medical officers licensed to practice and currently working in maternity units. Government managers and partners who were in some way involved in supporting provision of EmONC services and/or monitoring performance of these services. Participants who consented to be interviewed and participated in workshops.

Exclusion criteria

Facilities and Individuals who did not meet one or more of the inclusion criteria were excluded from the study as described in section 3.6.1

Recruitment and consenting process

Firstly, meetings were held with district management committees where details of the proposed research were shared seeking their support for accessing the participants. Upon their approval, they assisted with identification of appropriate BEmONC sites and participants for the study. An explanation was provided to the potential participants regarding the exploratory nature of the study, its aims, and the plan for data collection. An information pack which included the participant information sheet with details about the study, invitation to participate (Appendix I) and consent forms (Appendix II) CHECK APPENDIX NUMBERING for both key informant interviews and workshops were made available to potential participants. The participants were encouraged to read the information and were followed up on their decision to participate in the study. Those who agreed to participate were asked to sign the form before participating in the study.

Data collection tools

The guides provided the overall topics to be addressed in the sessions while using the HCD tools. BeMONC facility participants focused on issues affecting functioning of EmONC at the health center level; CEmONC facility participants discussed the functionality of the referral system; while program managers and others mostly discussed the benefits and challenges of the existing indicators and provided feedback on the new indicators.

Key informant interview guide:

The interview guide was used with different system actors who have experience with the existing EmONC framework to obtain detailed feedback on their experiences and perspectives.

Journey map template:

The journey map template was applied with the BEmONC facility FGD participants. The template provided a framework to provoke discussions about five selected signal functions (assisted vaginal delivery, manual removal of placenta, administration of anticonvulsants, administration of uterotonics for hemorrhage, and care during referral/transport). Participants went through the template for each of these signal functions, describing the steps taken to perform the signal functions, their confidence in completing these steps, what was working well and the challenges that they faced in performing these signal functions. They placed sticky-notes on the template to complete the template, which was used in the analysis, in addition to documenting what they said and how they interacted with each other.

Collage systems map images:

The images were used in the FGD with CEmONC facility participants. Images like those shown, including photos and illustrations, and as indicated in the list were assembled. The images were selected based on their relevance to the topic of referral system functionality. Participants were then selecting from these images as they described and developed a visual map of the BEmONC/CEmONC referral system and how it is functioning. The final map was used in analysis, in addition to documenting what they said and how they interacted with each other.

Sliders template:

The sliders were used with all participants, when asking perspectives about an existing indicator or as part of prototyping – to gather feedback on the newly proposed indicators. Participants were rating the indicator using four themes; Meaningful, Understandable, Easy to collect and Actionable by placing a post-it or a dot on the scale, and then describing why they had rated the indicator the way they did. The final slider evaluation was used in analysis, in addition to documenting what they said and how they interacted with each other.

Storyboard template:

The storyboard template was used with all participants when asked about a newly proposed indicator that was less well developed, in terms of, for example, how data was collected, analyzed, and used. Participants were given basic information about a new potential indicator and then asked to draw and write the different steps of the data story. The final storyboards were used in analysis, in addition to documenting what they said and how they interacted with each other.

Ranking template:

The ranking template was used with all participants when arranging domains that relate or affect the EmONC referral system in order, from the most important to the least. The participants ranked the four domains in EmONC referral system: Transport readiness, Referral efficiency and coordination of care, Care during transport and Financial Accessibility of referral. The participants were given the liberty to add any new domains to the proposed ones in order to make the referral system efficient. The final ranked domains were used in analysis, in addition to documenting what they said and how they interacted with each other.

Data collection procedures

Data collection

Data collection occurred between February 2023 and June 2023 using FGDs and KIIs. The FGDs, using HCD workshops with all participants in their respective groups (refer to table 6 and table 7), were conducted at a central location either in the southern or central region of Malawi.

HCD methods are intentionally designed to be interactive, utilizing both visual and audio elements to gain insights into participants' verbal expressions, actions, emotions, and thoughts. While capturing what participants say during FGDs is certainly valuable and

recorded, it is equally important to observe what they create and how they engage with the tools and one another, as these aspects contribute significantly to the learning process.

The documentation of participants' observations was carefully carried out through a combination of notetaking, sketches, photographs, and videos. Photographs and videos specifically captured participants engaged in various activities during the sessions. These visual materials played a crucial role in the subsequent analysis, allowing for a comprehensive understanding of the participants' experiences beyond what could be gleaned from audio recordings alone. The data collection process involved the active participation of four researchers throughout the entire research process, with each interview and focus group discussion recorded in audio format.

Data management

All the data that was gathered in various forms as articulated in section 3.9¹ including unprocessed data, was securely stored in password-protected drives, with access restricted solely to the study team. As per the established protocol, the data will be retained for a period of five years following the publication or dissemination of the study results. It is important to note that none of the participants opted to withdraw their data during this period. Qualitative data recorded digitally underwent an initial transcription process, preserving the original language, and using a structured transcription format. This verbatim transcription was done soon after the interviews or discussions, ensuring the preservation of the authentic conversation and thematic content. Concurrently, observations and assessments made during interviews were documented as field notes, further enriching the dataset. Additionally, notes taken during the interviews and group discussions supplemented the transcripts.

Trustworthiness

The trustworthiness of the study and its findings was assured by adhering to credibility, dependability, transferability and confirmability as follows: All interviews and group

discussions were audio recorded and field notes were written immediately after each interview.

The recorded interviews, focus group discussions and verbatim transcriptions were reviewed by the topic experts to verify completeness and clarity. Trained transcribers within the Kamuzu University of Health Sciences (KuHES) transcribed and translated the interviews to ensure accuracy and originality of the transcripts. Another qualitative expert checked the transcripts and compared them with the audios to maintain quality and originality. An HCD expert trained the research team to use the Human Centered Design approach to conduct workshops and observations. The training focused on introducing the HCD mindsets, empathy research, prototyping/ground truthing, insight generation and analysis.

Furthermore, the researchers used member checking to determine accuracy of the findings by taking the final report or specific descriptions back to participants to validate whether it was a true representation of what they had said and not the researcher's predispositions or inclination.

Data analysis

Qualitative data analysis was done through an iterative process, involving concurrent data collection and analysis. A team approach to analysis was employed to minimize individual biases and ensure comprehensive perspectives on the data (Sanders & Stappers, 2012). Through Miro-a real time virtual collaborating platform that facilitates designing, brainstorming, ideation, and data analysis, we used affinity mapping to identify preliminary themes. Affinity mapping organizes and groups ideas, problems, and solutions into related themes (Sanders & Stappers, 2012).

The goal was to categorize and organize a large body of information into a limited number of logical cohesive themes. This was helpful in visualizing and grouping similar data points to highlight commonalities and to identify patterns. We also collected and highlighted

interesting quotes and other expressions of emotions and possible workarounds that emerged.

The themes from the affinity mapping were used to develop the code book. Transcribed data from interviews and focus groups was coded by two coders using Nvivo 14 software. The codebook was amended as further themes emerged through coding the initial set of transcripts.

Through the analysis process, the team identified actionable insights which aimed to help envision possible opportunities for re-visioning the EmONC indicators and framework. Insights are deeper learnings that emerge from multiple data points, and may help explain latent motives, thoughts, or feelings. Insights are typically not something that research participants readily express in interviews, but rather emerge through continued analysis of the findings. The insights collected during the design research phase helped to envision possible opportunities for the EmONC re-envisioning process.

Ethical considerations:

Ethics approval was obtained from College of Medicine Research and Ethics Committee (COMREC). Permission was also sought from all the three District Health Offices, and from the in-charges of the selected BEmONC health centers (Appendices VII, IX, X) A Participant Information Sheet (Appendix XI) outlining the nature and purpose of the study was provided for each participant to read, synthesize the information and sign a consent form (Appendix XII) before participating in this study. A password was created for the data that was entered in the computer to limit the accessibility to the researchers only. Codes were used on data collection tools and no names of participants appeared on any data collection instruments for the purposes of confidentiality. Interview notes, transcripts and audio recordings were securely kept in an encrypted computer that was accessible only to the research team.

Research Dissemination

Results will be disseminated to the Malawi and global research community through international journal publications and presentations at international conferences and national research conferences in Malawi. Additionally, the report will be disseminated to all stakeholders working in the EmONC field in Malawi. Bound copies of this report will be given to COMREC. The report will be incorporated into the larger Re-Visioning EmONC global process.

Findings from the HCD workshops, interviews, and observations

Demographics of study participants

We did 10 focus group discussions and 10 key informant interviews. All 64 individuals approached for participation in the FGDs from the 3 districts agreed and participated; and of the participants who were approached for KIIs, 10 accepted and were interviewed. In total, N= 74 individuals participated in this study. Table 6 below shows the distribution of the participants in FGDs in relation to their role at the study site, and Table 7 shows the distribution of the participants in KIIs in relation to their role at the study site.

Table 6. Facility designation and type of participants who participated in the FGDs

Facility designation	Group participated	No of participants	Participant professional role
BEMOnC	Registered Nurse Midwives (RNMs)	n= 6	All were maternity in-charges
BEMOnC	Nurse Midwife Technicians (NMTs)	n=6	All were midwives working at maternal and neonatal units
BEMOnC	Facility In-charges	n=6	n=3 clinical officers n=3 Medical Assistants
CEMOnC	Transport	n=11	2= 2 Transport Officers 9= Drivers
CEMOnC	Clinical Officers (Cos)	n= 6	All were maternity COs. Of which, n-1 was an Anesthetist clinical officer

			and the head of theatre department
CEMOnC	Registered Nurse Midwives (RNMs)	n=12	Maternity in-charges, Safe mother hood coordinators and maternity midwives
CEMOnC	District Health Management Team (DHMT)	n=12	n=2 District Environment Health Officers (DEHO) n= 2 Directors of Health and Social Services (DHSS) n= 1 Health Services Administrator n= 2 District Medical Officers n=2- District Nursing and Midwifery Officers n-2 Nursing Officers n=1 Safe Mother Hood Coordinator
Policy Makers	National Team	n=5	n= 1 Chief Nursing and Midwifery Officer from Ministry of Health Directorate of Nursing and Midwifery n= Chief Reproductive Health Officer from Ministry of Health, Reproductive Health Directorate. n= 1 Obstetrician and an Independent Consultant in maternal and neonatal field n= 1 officer at planning department of the Ministry of health n=1 Family Planning and Sexual Health Advisor from Momentum Tikweze Umoyo (a partner organization to Malawi Ministry of Health)
Total		N=64	

Table 7. Study participants sampled for Key Informant Interviews (KIIs)

Participant role	# of IDIs
Clinical Officers who are maternity In-Charges from CEMONC facilities	n=3
Safe Motherhood Coordinators	n=3
Neonatologist	n=1
Neonatal Nurse	n=1
New Born Health Program Officer from the Reproductive Health Directorate of the Malawi Ministry of Health	n=1
World Health Organization Officer as a partner to Malawi Ministry of Health	n=1
Total	N=10

Technical feedback on past EmONC Assessment and the 2009 EmONC Indicators

Malawi has conducted several EmONC assessments and has used the EmONC framework and indicators to plan, implement and monitor EmONC services. To date, the country has conducted four EmONC assessments. While the assessments have been instrumental in helping the country plan strategies and interventions to reduce maternal and neonatal mortality and to track progress towards reaching national targets, they have also uncovered certain persistent problems with the functioning of the healthcare system. These persistent problems include challenges in making health centers fully functional basic EmONC facilities, challenges with referral between lower and higher-level facilities and problems hindering the delivery of consistent, sustainable high-quality EmONC services etc.

Guiding questions

- Were the signal functions performed in accordance with expected guidelines.
- How is the lack of the resources (human, material, infrastructure etc.) and generally an insufficient functioning health care system impact on the outcomes of care?

To this end, this assessment points to the need to look beyond the signal functions, and capture weakness in the system that will help to understand poor performance and identify locally applicable ways for improvement and indeed appropriate standards for a center of excellence.

Table 6: Summary of EmONC Assessment results over one and a half decade

SER NO.		2005	2010	2015	2020
	INDICATORS				
1.	Minimum number of comprehensive EmONC facilities	1.8 facilities per 500000 population Only 2% of the recommended number of BeMONC facilities (0.1% per 500000)	42 (47%) 5 (2%) BeMONC	the minimum number of comprehensive EmONC facilities is exceeded by 13. Gaps in the availability of EmONC facilities vary by district They are widest in Lilongwe (14) and Blantyre (10). In terms of the minimum recommendations of the UN Handbook, all districts had the recommended number of CEmONC facilities except Kasungu (1)	46 comprehensive and 31 basic EmONC, the minimum number of comprehensive EmONC facilities is exceeded by 9. Gaps in the availability of EmONC facilities vary by district. They are widest in Lilongwe (13) and Blantyre (11). BEmONC facilities, with gap widest in Lilongwe (17), Blantyre (10) and Mangochi (8)
2.	Geographical distribution of emergency obstetric care facilities	1.8 facilities per 500000 population but only 2% of the recommended number of basic facilities (0.1 facilities per 500,000 population)	47% offering services comprehensively and only 2% offering services at basic level.	There is a deficit of 107 basic EmONC facilities and the minimum number of comprehensive EmONC facilities is exceeding 13	46 facilities out of 77 offered comprehensive services while 31 offered basic EmONC. With a minimum number of comprehensive EmONC facilities exceeded by 9
3.	Met Need for EmONC	18.5%	22%	51% nationally 25% in EmONC facilities	29%
4.	Caesarean sections as a proportion of all births	2.8%	Less than 4%	3%	All facilities 7.8% EmONC facilities 3.9%

5.	Direct obstetric case fatality rate in EmONC facilities	3.4%	2%	1%	0.8% in all facilities 1.4 in EmONC facilities
	Most common direct cases of maternal mortality	<p>Ruptured uterus 7.9%</p> <p>Postpartum sepsis (6.9%)</p> <p>Postpartum haemorrhage (3.9%)</p> <p>Ectopic pregnancy (2.4%)</p> <p>Severe preeclampsia/eclampsia (1.8%)</p>	<p>Ruptured uterus (7%)</p> <p>Postpartum sepsis (12%)</p> <p>Postpartum haemorrhage (33%)</p> <p>Severe preeclampsia/eclampsia (7%)</p>	<p>PPH – 23%</p> <p>Puerperal sepsis – 19%</p> <p>Severe preeclampsia/eclampsia – 16%</p> <p>Ruptured uterus – 13%</p> <p>Complications of abortion – 7%</p> <p>Intrapartum and very early neonatal death 20/1000 deliveries</p>	<p>PPH – 25%</p> <p>Severe preeclampsia/preeclampsia – 14%</p> <p>Postpartum sepsis – 12%</p> <p>Ruptured uterus – 7%</p> <p>Complications of abortion 6%</p> <p>APH – 4%</p> <p>Prolonged/obstructed labour – 1%</p> <p>Ectopic preg- 1%</p> <p>Other complications of pregnancy – 5%</p>
6.	Intrapartum and very early neonatal mortality rate				22 per 1000 deliveries The national very early neonatal death rate at all facilities was 5.9 per 1000 live births.
	Human resources	<p>Vacancy rates –specialist doctors (82%), NO- (77.4%) and nursing sisters (87.8%), NMT (41.6%)</p> <p>45% of facilities – at least 1 practitioner</p>	<p>National level 40% of targeted NMTs)</p> <p>47% of the targeted registered nurses,</p> <p>28% of the targeted clinical officers and 43% of the targeted medical officers.</p> <p>Central hospital</p>	<p>ENM/NMT (gap of 7,077), clinical officers (gap of 1,443), laboratory technicians (gap of 229), medical assistants (gap of 602), RNM (gap of 360), lab Tech (gap of 317), anaesthetists (gap of 100), medical officers (gap of 37),</p>	<p>NMT gap -5,727</p> <p>CO gap – 1,762</p> <p>CMA – 503</p> <p>MA -447</p> <p>Anaesthetists oversupply by 102</p>

		<p>during day shift authorised to perform BeMONC signal functions (1 OBGYN, MO, CO or RNM)</p> <p>Evening shift 37% of facilities have requisite level staff-person</p> <p>EmONC signal functions 42% of facilities have the requisite staff during the day and this drops to 34% when looking at the evening shift.</p>	<ul style="list-style-type: none"> • Clinical officer (89%) • NMT 45% • RNM 28% <p>District hospital</p> <ul style="list-style-type: none"> • Clinical officer 21% • Medical officer 27% • Targeted NMT -57% • 39% of required registered midwives • 37% of required medical assistants <p>Health centre</p> <ul style="list-style-type: none"> • 14% of the required NMT • 11% of the required clinical <p>Minimum staffing at HC</p> <ul style="list-style-type: none"> • 2 MA • 2 NMT 	<p>obstetrician/gynaecologists (gap of 35), surgeons (gap of 34) paediatricians (gap of 27)</p> <p>Data suggests excess of Medical Doctors, lab techs and anesthetists in central hospitals leaving lower level facilities with severe shortages.</p> <p>HC at least 2 midwives and 2 medical assistants</p>	
		<p>4% of facilities OBGYN in day and evenings</p> <p>7% MO coverage 24Hr / day</p> <p>30% - CO available at all times. 13% of facilities have 24-HR RNM</p>	<ul style="list-style-type: none"> • 2 MA • 2 NMT <p>Monday to Friday (more than 50% hospitals) have onsite -</p> <ul style="list-style-type: none"> • 58% Drs • 89% COs • 80% RNMs • 93% NMT 		

		74% NMT/ENM – covers 24 HR shift	<ul style="list-style-type: none"> • 80% MA • ***these % drop drastically at night** 		
	Communication	70% of hospitals – land telephone 47% mobile	21% - <i>functioning land telephone in maternity</i> 29%- <i>functioning land telephone somewhere</i>	90% functional mobile phones owned by individuals	99 % at least one functioning mode of communication 85% - functioning cell phone owned by individual. facility-owned functioning cell phone (28 % of facilities). Functioning 2-way radios were found in only 2% of facilities functioning landlines in the maternity were found in only 6%.
	Communication	70% of hospitals – land telephone 47% mobile	21% - <i>functioning land telephone in maternity</i> 29%- <i>functioning land telephone somewhere</i>	90% functional mobile phones owned by individuals	99 % at least one functioning mode of communication 85% - functioning cell phone owned by individual. facility-owned functioning cell phone (28 % of facilities). Functioning 2-way radios were found in only 2% of facilities functioning landlines in the maternity were found in only 6%.
	Two-way radio communication	63% had functional radio sets	<ul style="list-style-type: none"> • 45% of CHAM hospitals, • 33% of Government rural hospitals 		

			<ul style="list-style-type: none"> • 20% of CHAM rural hospitals • 64% of Government health Centers • 60% of CHAM health Centers 		
	Transport – <i>A functioning mode of transport</i>	<p>Motor vehicle ambulance and functional -83%</p> <ul style="list-style-type: none"> - Motorcycle ambulance available in 7% of hospitals 	<ul style="list-style-type: none"> • 44% - <i>functioning motor vehicle ambulance</i> • 23% - <i>functioning motor vehicle</i> • 14% - <i>functioning motorcycle ambulance</i> 	<p>33% functioning motor vehicle Ambulance</p> <p>6% motorcycle Ambulance</p>	<p>41% of the facilities at national level had any type of ambulance on-site. Of these, 35% had at least one functional motorized ambulance on-site while 63% had motorized ambulances that needed repair.</p>
	Drugs	<p>Antibiotics were available in 50% of health centers.</p> <p>Magnesium sulphate only available in 58% of hospitals.</p> <p>Ergometrine - most available uterotonic in HC. 26% HC had oxytocin.</p>	<p>Anaesthetics and drugs for delivery of EmONC available in hospitals</p> <p>Sporadic stocks of <i>uterotonic drugs</i></p> <ul style="list-style-type: none"> - 28% of hospitals - 39% of health centers had stock out of oxytocin in the last 12 months. - 42% of hospitals and 36% 	<p>99 percent of all facilities with a pharmacy or supply of drugs stocked antibiotics</p> <p>99 percent of facilities stocked anticonvulsants/sedatives.</p> <p>96 percent reported having oxytocics or prostaglandins in stock.</p> <p>Only 35 percent stocked antihypertensives.</p>	<p>all facilities had a pharmacy. Gentamycin injection – common stock (95%).</p> <p>Diazepam injection anticonvulsant commonly stocked (88 % of facilities had it). 88 % oxytocin in stock. Methyldopa was antihypertensive commonly stocked (42 % of facilities).</p>

			<p><i>of health centers had stock outs of ergometrine.</i></p> <p>Misoprostol available in: 83% of hospitals 78% health centers</p> <ul style="list-style-type: none"> • 34% had stock out MSo4. • 46% health centers never stocking it 		
	Clinical guidelines	? not assessed	<ul style="list-style-type: none"> • Most facilities had • Missing on PAC (24%), FP (52%), FANC (52) IP (55%) 	<p>55 percent had focused antenatal care guidelines, 69 percent had immediate newborn care guidelines, 31 percent had kangaroo mother care guidelines, 54 percent had family planning guidelines, 81 percent had guidelines for management of obstetric and newborn complications, and 62 percent had PMTCT (maternal and newborn dosing) guidelines (</p>	<p>60 percent had antenatal care guidelines; 65 percent had integrated management of pregnancy, childbirth, postpartum and newborn care; 94 percent had guidelines for management of obstetric complications; 67 had guidelines for care for preterm or low birth weight babies; including kangaroo mother care guidelines; 69 percent of facilities had family planning guidelines and PMTCT (maternal</p>

					and newborn dosing) guidelines were found in 66 percent of facilities
	Performance of signal functions			99% facilities provided parenteral Oxytocics. 90 % provided neonatal resuscitation. 89 parenteral antibiotics.	98 % provided parenteral Oxytocics, 84 % parenteral antibiotics parenteral anticonvulsants 61%
				Least performed assisted vaginal delivery (28%), manual removal of placenta (40%), removal of retained products of conception (42%) parenteral anticonvulsants (58%). blood transfusion 84% surgery 76%	The signal functions least performed: assisted vaginal delivery (28%), removal of retained products of conception (41%) and manual removal of placenta (49%). BT 78% of Hosp C/S -67%
	Performance of Emergency newborn care (EmONC) signal functions				90% of health facilities performed newborn resuscitation with bag and mask. At national level, 37% of facilities provided antenatal corticosteroids. 60% of facilities administered antibiotics for pPROM

					<p>92% of facilities provided antibiotics for neonatal sepsis KMC was practiced in 90% of facilities.</p> <p>24% of facilities surveyed administered IV Fluids to neonates.</p> <p>42% of facilities surveyed administered oxygen to ill neonates.</p>
	Signal functions often missing.	<p>HC Assisted vaginal delivery (96%) Removal of retained products (94%) Manual removal of Placenta (80%)</p> <p>Hospital Assisted Vaginal Delivery (38%) C/S (38%) Removal of retained products (32%) Blood transfusion (26%) Manual removal of placenta (21%)</p>	<ul style="list-style-type: none"> • Parenteral anticonvulsants • Assisted vaginal delivery. • Removal of retained products of conception. • Manual removal of placenta 		<p>assisted vaginal delivery (AVD) (28% of facilities), removal of retained products of conception (41% of facilities), manual removal of placenta (49% of facilities) and administration of parenteral anticonvulsants (61% of facilities).</p>
	Availability of staff to perform signal functions			<p>99% of facilities had staff to provide parental oxytocics. 89% - parental antibiotics</p>	

				<p>90% neonatal resuscitation</p> <p>28% Assisted vaginal delivery.</p> <p>40% manual removal of placenta</p> <p>Removal of products of conception 42%</p> <p>59% of staff used magnesium sulphate while 15% used diazepam</p>	
	Reasons for not performing signal functions			<p>Of the 72% of facilities that did not perform AVD in the, 44 % lacked supplies, equipment or drugs. 28 percent cited training issues. 24% had no indication for performing the procedure. 9% lacked human resources. 42% of facilities did not provide parenteral anticonvulsants - no indication to do so (85%) 8%- due to policy issues. 2 % lacked the appropriate drugs. Of the 59% of facilities that did not perform removal of retained products, 44% lacked supplies, equipment or drugs while 37% had training issues.</p> <p>Non-performing C/S – lack of supplies,</p>	<p>lacked supplies, equipment, or drugs, unsupportive or no policy in place facilities had no indication for performing the procedure.</p>

				equipment or drugs and policy issues (31%) Reason for not performing blood transfusion was lack of supplies, equipment or drugs (62%).	
	Facility readiness to perform signal function			assisted vaginal delivery was the least performed (28%)	provision of parenteral anticonvulsants and performance of assisted vaginal delivery), facility readiness was greater than actual provision of the signal function.
	Facility readiness to provide EmONC signal functions			83% of facilities there is no difference between facility readiness and actual provision. Safe administration of oxygen therapy, the readiness is greater than provision. For the remaining 5 EmONC signal functions, the actual provision is greater than facility readiness (meaning performed under suboptimal conditions)	

KEY INSIGHTS FROM THE MALAWI RE-VISIONING EMERGENCY OBSTETRIC AND NEONATAL CARE STUDY

We embarked on this study to learn how to make the EmONC framework and EmONC indicators more useful for planning and monitoring good-quality, equitable health services that effectively prevent, identify, and clinically manage maternal and newborn complications. In this section, we present and analyze research insights. We discuss insights that impact provision of emergency obstetric and neonatal care. We use direct quotations to demonstrate the link between the emerging insights and the data. This gives the reader narrative evidence of provision of Emergency Obstetric Care in a Malawian setting. The following are the insights that were gathered from the data:

Insight 1: Healthcare workers' ability to provide timely and effective emergency obstetric and neonatal care is frequently hindered by the dysfunctional referral system, which not only disrupts the continuum of care but also substantially amplifies the distressing rates of maternal and neonatal morbidity and mortality.

Health workers and drivers perceived the referral system from BEmONC to CEmONC centers as often dysfunctional with weak operational support from top management. This was one of the barriers that prevent women and neonates from receiving emergency obstetric and neonatal care. There are many factors that contribute to this dysfunctionality including protracted procurement procedures for ambulance repair and maintenance, reliance on old ambulance fleets, and poorly serviced and ill-equipped ambulances frequently running on low fuel tanks. Moreover, the scarcity of fuel consistently forces the withdrawal of ambulances from Basic Emergency Obstetric and Newborn Care (BEmONC)

facilities. Consequently, this compels women to resort to costly private transportation options, placing an undue burden on their financial resources. Additionally, health care providers feel that poor road infrastructure, poor geographical access, long distance from BEmONC to CEmONC sites also present a fundamental and challenging barrier to accessing adequate EmONC care.

Despite the fact that ambulance maintenance ensures that the vehicle is always in a dependable functioning state, which is crucial for the safety of women and newborns during referral, health care providers, transport officers and ambulance drivers from almost all BEmONC facilities expressed concern that the District Health Management Team (DHMT) takes too long to facilitate procurement processes for repair and maintenance of ambulances due to inadequate funding, as such facilities use old and un serviced fleet with worn out tires for referring women to the higher levels of care. This affects referral processes and emergency response to timely care.

Both DHMT and health workers, along with policymakers, transport officers, and drivers, identified the lack of ambulance maintenance as a prominent issue. This is aggravated by the use of outdated and poorly maintained ambulance fleets, some of which have worn-out tires with insufficient pressure to support high-speed emergency transport. Furthermore, ambulances are not consistently cleaned and disinfected between emergency responses, increasing the risk of infection for women and neonates as well as health care providers and drivers who handle them during emergency response. The following excerpt from a driver highlights how the old fleet and un serviced ambulances affected the referral system.

“... even the condition of the vehicles is really bad because they are never serviced... use very old and worn-out tires. We force the vehicle to accelerate but it doesn’t accelerate the way we want.”

Health Care Providers further reported that even when economical and well-functioning health systems are in place, there is also poor geographic access which continues

hampering efforts towards emergency response. Poor geographical access to BEmONC sites, including terrible roads, bridges, and rivers, prevent ambulances from collecting women and newborns, resulting in delayed referral. Further, distance and poor road infrastructure affect maternal and neonatal health outcomes.

“It takes a long time to pick patients from BEMONC to the CEMONC facility. It may take two or more hours due to the long distance; it takes 5 hours or more to go back with the patient. This further complicates the woman’s condition” (CEmONC CO).

“There is a road but once it rains, many roads here ... are not used, the road is too muddy. So maybe it could be an issue concerning politics, there are Members of Parliament (MPs) there but for them to maintain roads, to think that there is a hospital there, not at all, we are suffering quite a lot “(BEmONC Driver).

In agreement, a transport officer narrates a scenario explaining poor road infrastructure that hampers effective referral system.

“A certain scenario happened last year when I received calls from X health center which is about 112 km to the district hospital and another Y health center that is almost 89 km from the district hospital, but these facilities are on the same side and most often we like to combine the ambulance services. I instructed the driver to rush to go and get a maternity patient at the furthest distance of 112 km then pass to Y health center and get the other maternity patient and come back with both of them. But Alas! This was rainy season, so the driver started off around 2 or 3pm. Unfortunately, the condition of the road was not good. When he was remaining with 20 something kilometers to facility X, he found that a certain car ahead is stuck in a river: the water is at hip level and there is no bridge. So, he stopped to wait that maybe the car will be removed so that he passes but it didn’t happen. And imagine there is an emergency at facility X and another emergency at facility Y, yet the driver is trapped. He made a U-turn and went to facility Y. He took the maternity patient at facility Y and reached the district hospital around 11/12 midnight. The patient arrived at CEmONC site, but it was too

late. The woman was pronounced dead on arrival. I couldn't believe it was a maternal death! And in all this the community blames the transport office yet the driver did not choose to delay, very bad roads, potholes, rivers with no bridges ..." (Transport Officer, CEmONC).

Health workers also revealed that almost all BEmONC facilities had no stationed ambulance on site or other appropriate mode of transportation for referring women and neonates to a CEmONC facility affecting referral processes and emergency response. In such situations, the health care providers ask patients to hire or use public transport to be transported to the next higher-level facility for adequate management: Health workers from BEmONC sites exemplify this.

"There is no stationed ambulance at facilities resulting in making the patient and guardians pay for public transport to the referral facilities" (BemONC CO).

"Preferably the ambulance should be there at the BEmONC facility. Of course, we were given an ambulance, but they took it back. They bring an ambulance for you and say, this is your ambulance, then they came and took it" (BemONC NMT).

Consequently, health care workers had to make alternative arrangements (use of taxis/Sienta, personal vehicles, motorcycles, etc.) and non-standard modes for the women and/or neonates, which increased the risk of an adverse outcome or even death. A Nurse Midwife Technician explained that *"we tell them that if the ambulance is not available, maybe due to fuel shortage or due to poor road, you are required to use your own transport."* As such, additional transportation costs are incurred by women and their families to get the appropriate required emergency obstetric care.

The problem of transport is further compounded by inadequate fuel funding for health facilities in Malawi. Following the 25 percent devaluation of the Malawi kwacha that led to the hike in fuel prices, the district health management team agreed to recall ambulances from clusters to limit the running fleet and had to put in place only few ambulances to

operate during day and at night. This gesture worsened healthcare services in the districts. District health management team also reported little funding allocated to districts for operations, sometimes only receiving 10% of their annual budget thereby crippling the effectiveness of the health system.

“There is little funding allocated to districts for operations, sometimes we only receive 10% of the annual budget crippling the effectiveness of the health facilities.”

In other circumstances, health workers highlighted that the ambulance might be available at CEmONC site as a receiving end but might be deployed for other duties or to a meeting causing further delays to emergency response as explained below.

“We may have ambulance available on site or at the referral facility, but you hear that, the ambulance being the only available vehicle around, has ferried people to a meeting or has been assigned other duties, causing more delay to attend to the referral cases at hand” (CemONC RNM).

Additionally, the essential equipment meant for emergency response in the ambulances was removed to create more space for transportation of commodities or to accommodate more patients from several health facilities. One Transport Officer confirmed that.

“The ambulances that we have at the moment do not have any equipment that you can say they can help someone to help a patient; but the issue is that we rush with her so that she can be treated at a big hospital. But to say that some equipment is available in the ambulance, aah, no!” (Transport Officer)

However, ambulance drivers had contrary views regarding emergency equipment in ambulances. One driver expressed the following concern:

“... even if the equipment was available in the ambulance, we are usually a driver and the patient. That means you cannot stop driving the vehicle and start treating the patient. So if this equipment is to be available it is required that you should be with a nurse or one person who is well trained from that facility so that he or she should be managing that” (CEmONC Driver).

The other controversial issue among different groups was that of escorting women with obstetric complications to CEMONC sites. BEmONC staff lamented.

“I really want to escort women and babies with complications to the referral facility, but they (DHMT) are not going to give me transportation for me to come back to my Health Centre. I will have no meals, no accommodation or care.” (Nurse Midwife Technician).

Insight 2: Health workers often experience delays in providing essential emergency care to women and neonates due to communication hindrances between BEmONC and CEmONC facilities within the referral system, resulting in decreased survival rates and increased stress and anxiety among the women and neonates.

Referral between a BEmONC and a CEmONC facility is dependent on functional and available communication and transportation. Health workers at BEmONC sites are expected to communicate with the referral facility (CEmONC center) before referring a woman with obstetric complication. They are expected to request for transport as well as communicate information on the patient's condition before transfer.

Different modes of communication including cellphone conversation, messaging on WhatsApp and using maternity ground phone or switchboard exist. WhatsApp communication increases the ease and ability of healthcare providers to communicate with both their peers and senior staff at BEmONC and CEmONC levels to provide each other with emotional, social, and/or clinical support. However, the only setback is that not all staff have cellphones let alone WhatsApp. Senior practitioners are also able to

communicate with midwives and other healthcare providers in order to provide insight or information or to discuss patient's condition.

However, emergency messages have to pass through many layers of communication at CEmONC level before reaching the right person that makes the decision to release the ambulance. This acts as a barrier to effective emergency obstetric and neonatal care referral even if the ambulance is available. A Nurse Midwife Technician at BEmONC Centre explained this.

“At times, delays are as a result of a complicated communication system even if the ambulances may be available. This is because the health Centre staff may call the CEmONC nurse in the maternity ward who is supposed to inform the switchboard to inform the driver about an emergency, but they forget and remember after some time, may be 30 minutes. So, the main issue here is delay in communication” (BEmONC NMT)

In agreement, one of the drivers narrated:

“... we are stationed at the district. When the BEmONC staff at the health Centre calls that there is an emergency, the communication reaches administration and the bosses tell the transport officer, then he calls the driver to tell them to go to this facility.”

Consistently, the Transport Officer admits the problem of long communication processes:

“Most of the times information reaches the maternity directly from BEmONC site then maternity calls the switchboard operator to call the driver to collect the maternity patient at health Centre X. Sometimes the call comes from health Centre directly to switchboard on request for an ambulance to pick a maternity patient. So, when this happens, the switchboard operator tells the driver who is available on that day to go to the BEmONC site. But in other circumstances, because of fuel crisis this year, when BEmONC Centre calls switchboard, they ask me what should we do? So, I say, tell this particular driver to go if fuel is available but

when we have no fuel, the switchboard operator informs the DNO to know the condition of the maternity patient to assess if the patient can wait or an ambulance should still go, so DNO acts. Once verified, the DNO calls me directly that the ambulance should go, inform the driver to start off to pick the maternity patient. That's how our system operates here" (Transport Officer CEMONC).

Another BeMONC RNM said:

"There is no focal person who coordinates referral communication at CemONC facilities, and this delays timely emergency response."

Similarly, communication is further affected by lack of official phones in BEmONC facilities, as such, official airtime is loaded in personal phones, to the disadvantage of other officials who might want to use the phone when the owner of the phone is off duty. This is compounded by very bad cellphone network in some BemONC facilities causing challenges when making calls for emergency referral as lamented by one of the BEmONC NMTs:

"...there is no means of communication because we don't have an official phone and we lack airtime. Some of us, where we are coming from, sometimes the network is very challenging" (BEMONC NMT).

Occasionally, the DHMT allocates very little airtime of approximately MK4000 to K6000 per month to BemONC facilities to be split between OPD and maternity units. This amount of airtime is not adequate for all emergency communications per month hence some women and neonates might be referred without proper consultations on initial management in the absence of appropriate protocols and guidelines.

Insight 3: Health workers face significant risks and hazards in the referral process, which not only jeopardize the well-being of women, neonates, midwives, and ambulance drivers but also erode confidence in performing critical emergency obstetric and neonatal signal functions.

Midwives and ambulance drivers described a referral process as a risky and hazardous endeavor for a lot of players involved in the referral process including the women who developed complications requiring referral, neonates, midwives at the BEmONC facility and the ambulance drivers. Ideally, a woman or neonate is supposed to be escorted by a skilled provider during referral to CEmONC facilities. However, all players involved in the referral process appeared to become victims of the poor referral system. For example, referred women and neonates are not escorted by a skilled health worker due to shortages of staffing and lack of logistics to provide accommodation and transport back to their duty station. This poses a danger to the patient because they travel without monitoring the condition and without further management. To that end, the patient can develop further complications on the way or even give birth before arrival at the CEmONC facility.

The following excerpt explicates the midwives' experiences when they escort a patient to a BEmONC facility:

"Midwives are often stuck when they escort a patient to a referral facility because they are not provided with transport back home; neither are they provided with an allowance to get accommodation. As a result, we opt for patients to be transferred alone with only the ambulance driver..." (Nurse Midwife Technician).

"I really want to escort the women with complications or baby to the referral facility, but they are not going to give me transportation for me to come back to my Health Centre. I will have no meals, no accommodation or care." (Nurse Midwife Technician).

These findings illustrate the difficulties that the skilled providers experience when they attempt to escort patients to the referral facility rendering the providers to decide not to escort the patient. However, it was reported that when the skilled provider does not escort the patient, then the ambulance driver will have to transfer the patient alone without a qualified health worker. In certain circumstances the drivers become 'midwives' because

they have to assist a woman when she wants to give birth before arriving at the referral facility as illustrated in the following excerpt:

“Drivers act as midwives because we have no option; when a woman wants to give birth as I drive to the referral facility, I have to stop and assist the woman. In fact, I have conducted many deliveries delivering babies” (Ambulance driver).

Another driver said:

“We were employed as drivers. Now we work as mechanics, and midwives as we conduct deliveries in ambulances on the way to referral facilities” (Ambulance driver).

One driver encountered a twin gestation and narrated his story of how he assisted with conducting a twin delivery on the way to the referral facility in the excerpt below:

“I took the ambulance to go get the patient; I had all the gloves and other supplies in the vehicle. On the way to the referral facility, it seemed the patient was about to deliver. The guardian asked me to stop the car, and I stopped then I helped the patient. I noted that she had twins after I delivered the first baby, cut the umbilical cord then when I was about to remove the placenta, I saw another baby coming, I was like, oh! This is how twin delivery looks like. Then I went ahead and delivered the second baby, tied the cord and rushed them to the referral facility....” (Ambulance driver).

However, for some drivers, they said they could not assist the woman give birth since they were not trained to assist with the birth as explained by one of the drivers below:

“The potholes facilitated delivery of the baby because as a driver, what I know is to drive the ambulance; so even if the woman may need help on our way to the district hospital, I just drive because I do not know how I can help a woman” (Ambulance driver).

From the drivers' accounts, it shows that some are acting like skilled health care providers assisting women to give birth on the way to referral facilities. However, this act poses a great danger to them because they are not trained midwives. Additionally, they have not been trained in infection prevention, and they lack proper infection prevention materials. Therefore, assisting with the delivery poses a risk for them to contract infections. One driver said:

“Drivers lack first aid and infection prevention knowledge and are at risk when helping women and neonates during referral” (Ambulance driver).

Insight 4: Health workers lack confidence and institutional support to perform signal functions which leads to delays, inappropriate management and unnecessary referrals, as well as fears of punishment in the case of adverse outcomes.

Health workers' confidence levels were associated with performance of specific signal functions specifically, giving of anticonvulsants, conducting assisted vaginal delivery, vacuum extraction and manual removal of placenta. Most health care workers from BEmONC sites lacked confidence in administering Magnesium sulphate. The provider's fear of MgSO₄ negative events undermined trust in its safety and created barriers to its use. Some health workers are scared, hesitant, or apprehensive about using MgSO₄ more especially when there is a new brand and there is no clear guidance on the administration of the drug. This has been clearly illustrated by an NMT at BEmONC site:

“The type of Magnesium Sulphate available is one of the drawbacks; sometimes it comes in different brands, and you find that you are used to the one with 20% strength and yet you have been supplied with MgSo₄ with 50% strength and you are required to make 20%.....” (BEmONC NMT).

Another participant also explained:

“The lack of confidence is also attributed to the fact that BemONC staff are not oriented on new brands of drugs and medicines which affects prescription and administration of drugs given to women and neonates, consequently compromising safety” (BEmONC RNM).

Another participant expressed fear of giving an overdose or underdose as expressed below:

“We fear that maybe we can give an overdose to the patient or even under dose because we are not very sure of the exact grams to give; this has to do with competence on how to dissolve the new brand of Magnesium Sulphate medication and even how to administer it” (NMT BEmONC).

“Another participant said:

“Simply put, this is to do with the lack of knowledge on the actual dosage and administration of the new regimens of magnesium sulphate” (NMT BEmONC).

Participants also expressed that the fear to administer Magnesium Sulphate is compounded by the lack of calcium gluconate, an antidote for Magnesium Sulphate toxicity as explained by an RNM from BEmONC facility:

“There is no Magnesium antidote; we are afraid to administer Magnesium Sulphate in case the woman will experience Magnesium Sulphate toxicity, we have no antidote to reverse the complication. So, this also brings fear, and we are reluctant to administer the drug” (BEmONC NMT).

Participants expressed that the fear is really heightened when providers face the possibility of being held responsible by the regulatory body for undesirable events following

administration of Magnesium sulphate. One RNM from a BEmONC site expressed the following:

“We fear that our licenses will be revoked by the Nurses and Midwives council of Malawi if we make a mistake and there are some adverse events following administration of Magnesium sulphate” (RNM BEmONC).

The midwives however, compared the difference in managing similar offences between the Nurses and Midwives Council of Malawi and the Medical Council of Malawi as regulatory bodies as illustrated in the following quote:

“The same issue can happen with a clinician; they may make the same mistake, but their regulatory body isn’t harsh on them like the Nursing and Midwifery body is on us. For example, the clinician would lose a number of patients at outpatient department in a single day, but you will never hear that the Medical Council went to inquire why people are dying yet for us we are afraid that if one dies on me whilst in the course of management then my job is at stake. So, it’s better I should leave these other things to the senior members, or I should just refer the case to someone although it is an emergency” (BEMONC RNMs).

The health workers however, lamented the lack of drills at the facility to enhance competence in order to fully equip them to handle emergencies such as eclampsia so that they are able to provide timely and appropriate treatment to patients with emergencies. This was highlighted in the following quote by an NMT:

“The other challenge in our facility is the lack of drills for obstetric and neonatal complications. When you participate in drills, for example, management of eclampsia and the other emergencies you become more competent; you are reminded of how to handle them, but we don’t really do them very much for us to know how to prepare for the emergencies so that when you are faced with a real situation, you know what to do” (NMT, BEmONC).

Similar fears as experienced with the administration of Magnesium Sulphate were also expressed with performance of vacuum extraction. Participants expressed lack of confidence to perform the procedure as expressed by one of the BEmONC RNM.

“You may find that in a health facility of 4 health workers, there is only one health provider who is confident enough to conduct vacuum extraction” (BEmONC RNM).

The lack of confidence was also attributed to lack of skills despite the training they received as expressed below by BEmONC RNM:

“Some nurses are not sure how they will manage the vacuum extraction procedure despite being trained; they doubt that they cannot perform the procedure well, despite being trained, they will still refer the patient to somebody else because they are not so sure that they are going to do it themselves” (BEmONC RNM).

This was demonstrated by the fact that there would be just one person with skills to conduct the vacuum extraction procedure as highlighted by a BEmONC RNM below:

“You may find that in the health facility of four health workers, there is only one who is confident enough to conduct vacuum extraction” (BEmONC RNM)

As a result, both RNMs and NMTs rely on teamwork to perform certain signal functions like vacuum extraction and manual removal of placenta. As expressed by one BEmONC RNM below:

“Teamwork is key when it comes to performing procedures which we are not competent in. We do not hesitate to consult the one who normally conducts the procedure because we know she/he has the skills. We work as a team to treat the complication....” (BEmONC NMT).

Teamwork was also demonstrated when one was not sure on the assessment to identify position of the fetal head in order to identify where to place the vacuum cup as exemplified in the following excerpt:

“Sometimes it is difficult to identify position and sutures and fontanelles, since we are nurses at different cadres; we will crosscheck findings with other cadres with more experience” (BEmONC RNM).

Insight: Healthcare providers experience fatigue, burnout, and a compromise in their well-being due to the imbalanced staff-patient ratios within Basic Emergency Obstetric and Newborn Care (BEmONC) facilities, significantly affecting their performance and their ability to uphold professional standards when caring for women with complications.

The current workforce shortages and the rising number of women requiring care during the perinatal period in Malawi intensify the health care providers’ difficulties in providing care and making competent decisions during provision of care to the women and neonates. Health workers perceived that unbalanced staff-patient ratios in BEmONC facilities increase workload, leading to stress which has a significant negative effect on job satisfaction and employee performance. One Clinical Officer affirmed that:

“Sometimes we face situations where you are forced to temporarily suspend caring of one patient to attend to another patient who is just arriving because of their condition. It happens that you are all alone on duty. This affects the quality of care you provide to women and neonates because you have no time to assess them as well and manage their conditions on time” (CO).

Other BEmONC Nurse Midwife Technicians observed that understaffing makes it difficult to perform certain procedures such as vacuum extraction and to escort women and neonates with obstetric complications when need arises.

“We fail to escort patients to the referral facility because we are understaffed and that puts the patient at risk of developing further complications during transportation” (BEMONC NMT).

The shortage of staffing also leads to inadequate time for the health workers to provide quality care to women and neonates which impacts on their performance and ability to meet professional standards during the care. Providers indicated that such circumstances forced them to take short cuts as exemplified by one clinical officer below.

“We do short cuts when managing women with complications because of increased workload which affects the quality of care.” (CO).

In other circumstances, due to shortage of staffing, other unqualified cadres of staff are allowed to provide care to women with high-risk conditions and yet they are not trained to do that. This situation puts the women and neonates at risk but also negatively affects the quality of emergency obstetric and neonatal care services provided to women and neonates. One Nurse Midwife Technician asserted that:

“Sometimes there is only a Certified Midwifery Assistant (CMA) on duty who has no skills in high-risk midwifery and cannot perform vacuum extraction and yet there is a client who requires the procedure like vacuum extraction or manual removal of placenta; this becomes a problem” (BEMONC NMT).

Compounding the issue of inadequate staffing is the unavailability of onsite housing for health care providers. This makes it difficult to provide emergency obstetric and neonatal care on time since health care workers have to travel some distances to attend to the patients. Ideally, obstetric and neonatal care providers are expected to be housed close to the hospital so that they are easily accessible when they are on call and are required to go to the hospital to attend to emergencies. However, the housing provision is not available

to all health care providers, forcing others to find accommodation far from the hospital. It takes a long time for such providers to be on site to respond to an emergency, causing delays in the management of women and neonates requiring their care.

This has been explicated in the following excerpt:

“There is no on-site housing for health personnel and ambulance drivers, rendering them not immediately available in times of emergency, leading to delays in provision of emergency obstetric and neonatal services” (CO, BEmONC site.).

A BEmONC NMT made similar comments.

“If you are posted to a health center, the perception is that it is equal to occupying a free house; so there is commotion if one does not get the free house and is expected to rent out accommodation, that’s where the challenges come in when you tell them they are going to a health center but there are no houses (BEMONC Facility In-charge

Similarly, drivers are equally expected to get housing to stay closer to the facility. However, there are no houses built for the drivers. As a result, they stay far from the health facility. When there is a call for ambulance, the driver is supposed to walk to the health facility to get the ambulance and go to pick up a woman or neonate being referred. One driver narrated the following:

“... so you are forced to go and find a house for rent somewhere; but now when people build their houses they don’t build them close to the health facility for so and so to be staying there... then you happen to be staying a little bit far; and when they want you there and then you think how am I going to walk in the night for me to reach at the facility, that is 12 o’clock midnight. At the end then you say I am not going there because I can be attacked on the way, and if they send you a guard to follow you at home then that place stays without security.” (Driver)

“BEmONC facilities have few staff houses that limit the number of staff to be deployed at the facility, making it difficult for women and neonates with complications to timely access care” (BEmONC NMT).

Insight 6: Health Care Providers are not able to provide BEmONC and CEmONC functions due to ageing infrastructure, unavailability of equipment, supplies, and medications, and outdated guidelines and protocols resulting in elevated maternal and newborn morbidity and mortality rates.

Health workers reported lack of infrastructure, essential equipment, medications, and supplies to handle emergency obstetric and neonatal complications as a key barrier that predisposes women and neonates to risk of death. Poor hospital infrastructure e.g. dilapidated hospitals that were built long time ago have inadequate space to accommodate women and neonates with complications. A Registered Midwife from CEmONC had this to say:

"We don't have enough room to keep pregnant women in the ward, so there is overcrowding in the rooms; including the antenatal care waiting rooms, labour rooms as well as in postpartum room where other women sleep on the floor in the spaces available. Unfortunately, the clients with obstetric complications would end up developing some infections besides the obstetric or neonatal complication itself making the condition worse. But there is nothing else we can do" (CEMONC RNM).

In other situations, important sections such as high dependence units and neonatal intensive care units are not emergency ready which endangers survival rates of women and neonates respectively. The following quote from a BEmONC RNM explicates this.

“The high dependence units and the neonatal intensive care units have no essential supplies, equipment and medications to handle women and babies who are critically ill. This sometimes leads to loss of life” (BEmONC RNM).

In some BEmONC facilities, essential equipment, drugs and supplies are either not available or not working. For instance, health workers had knowledge on assessment of clients with pre-eclampsia but lacked laboratory diagnostic reagents like urine dipsticks to confirm diagnosis of severe pre-eclampsia/eclampsia. As such, they administered Magnesium Sulfate without full investigation of the condition. This limits the health workers’ ability to effectively manage women and neonates with complications as explicated by the BEmONC CO below.

“We do not have gynecological beds in our maternity wards to perform some procedures” (BEMONC CO).

Another participant said:

“Sometimes BEmONC sites lack essential materials such as BP machine and batteries that limit midwives to assist women effectively” (BEmONC NMT).

Additionally, another BEmONC NMT illustrated the following:

“Sometimes we lack materials for taking blood samples prior to referral of a patient to the district” (BEMONC NMT).

Similarly, clinical officers from CEmONC complained that sometimes inadequate or non-functioning equipment puts women at risk as illustrated in the following quote.

“...Inadequate cesarean section materials e.g., non-functioning theater lamps at times which might lead to staff to doing wrong procedures like ligating the bladder accidentally” (COs, CEmONC).

For the DHMT, the major concern was on non-functional resuscitation materials for the neonates.

“Sometimes we do have the equipment for resuscitation which is very old and non-functional such that you cannot use it efficiently to save the life of the baby” (DHMT)

Participants suggested that government must seriously consider increasing budget for the health sector in order for the Ministry of Health to be able to procure necessary resources and equipment for management of maternal and neonatal complications as highlighted by the DHMT below.

“There is need for more funding to enable health facilities have necessary resources and medical equipment such as fuel, vacuum extraction machines, refrigerators to keep oxytocin, batteries for Bp machines etc. necessary for their operation” (DHMT).

Participants also lamented about the lack of guidelines and protocols which lead to mismanagement of obstetric emergencies as indicated below.

“Most protocols and guidelines are outdated and sometimes not available in health facilities resulting in health workers making incorrect decisions on drug dosages that may potentially harm the women and neonates” (BEmONC NMT).

The participants indicated that it is important to have updated guidelines and protocols for the management of obstetric and neonatal complications in order to serve clients better.

“There is a need to share and circulate updated protocols and guidelines on the management of complications so that midwives are adequately equipped to serve their clients (BemONC NMT/RNM)

They specifically lamented about the lack of guidelines and protocols to guide health care workers to administer new brands of Magnesium Sulphate for management of eclampsia and severe preeclampsia. The BEmONC facility In-charge illustrates this.

“There is a lack of protocols and guidelines for management of eclampsia and severe preeclampsia in our facilities where we are using the new brand of magnesium sulfate which we have been told that it is administered intravenously only. We do not have guidelines; but we abandon the initial one and we are forced to start using the new one without guidelines which is risky in case we make mistakes” (BEMONC Facility In- charge.)

3.3 Technical Feedback on New EmONC signal Functions and Indicators (Ground truthing of Indicators)

		SIGNAL FUNCTIONS			
Levels of Care		OBSTETRIC		NEONATAL	
		Administer medications to treat PPH	The participants were okay with this proposal	Perform newborn resuscitation with bag and mask.	This should also be performed at BEmONC and the participants further suggested that the they should perform newborn resuscitation other than prescribing the bag and mask to them
		Administer parenteral	1. Antibiotics should be administered at BEmONC facilities because of increased number of women and neonates who suffer from sepsis		

BASIC EmONC	antibiotics.	<ul style="list-style-type: none"> • However, participants suggested that there is need for caution on administration of antibiotics to avoid resistance. • There is also a need to be intensifying infection preventions control (IPC) 		
	Administer magnesium sulfate	They recommended that it be maintained at BEmONC	Administer oxygen therapy	Agreed with administration of Oxygen therapy at BEmONC facility
	Remove retained products of conception	The participants were okay with the proposition	Enable feeding with expressed breast milk	They agreed with this proposal and suggested that due to lack of resources and skills in feeding, there is need to train health workers in feeding preterm neonates and provide resources
	Perform assisted vaginal birth.	Should be maintained at BEmONC facilities. However, there is need to have Ambulances stationed at the facility. Health providers should have necessary skills for assessing and perfuming Vacuum extraction. Suggests maintaining	Enable kangaroo mother care.	The concept of Kangaroo mother care should be promoted at the BEmONC facilities

			the old terminology of “administration of uterotonics” rather than medication to treat PPH		
		Perform manual removal of placenta.	<p>Should be performed at BEmONC facilities as it was before.</p> <p>Retained placenta is an emergency and must be removed immediately.</p> <p>Due to transportation challenges in Malawi, a woman can die of severe bleeding if not removed in good time.</p> <p>Patients should be referred to CEmONC facility for uterine exploration.</p> <p>Registered midwives and Clinical officers should be deployed in BEmONC facilities to effectively manage Manual Removal of</p>		

			Placenta		
		Provide IV fluid replacement therapy	The participants were okay with the proposition		
		Continued clinical care during interfacility transfer	They agreed that women and neonates with emergency complications must have an escort during referral but suggested a stationed ambulance at BEmONC facilities and that the Health workers welfare must be taken off in terms of accommodation and return transport		
	COMPREHENSIVE EmONC	Administer antenatal corticosteroids	Participants recommended that antenatal corticosteroid should be maintained at BEmONC facilities	Provide CPAP	They agreed that this should be done at CEmONC

			<ul style="list-style-type: none"> • They already administer at BEmONC • In case of preterm delivery lung maturity should have already developed 		
		Perform cesarean section	They had no problems	Provide phototherapy	They agreed that this should be done at CEmONC
		Perform blood transfusion	Should start at CEmONC facility	Perform Exchange transfusion	<ul style="list-style-type: none"> • The normal blood transfusion should be done at CEmONC facility as well since it is currently done. • The exchange transfusion should go to intensive EMoNC
		Perform blood transfusion	Should start at CEmONC facility	Perform Exchange transfusion	<ul style="list-style-type: none"> • The normal blood transfusion should be done at CEmONC facility as well since it is currently done. • The exchange transfusion should go to intensive

					EmONC
		Provide intensive level organ support	Agreed with the provision of intensive level organic support		<ul style="list-style-type: none"> Should start from CEmONC because there are ophthalmic clinicians
	INTENSIVE EmONC	Provide intensive level organ support	This can also be done at CEmONC facility as long as there are resources	Perform mechanical ventilation	Agreed to be maintained at intensive EmONC
				Perform screening and treatment for retinopathy of prematurity	Agreed to be maintained at intensive EMoNC

Emergency obstetric care indicators and their Implication on midwifery practice

Availability of Emergency Obstetric Care

This indicator focuses on the availability of EmONC services. Adequate coverage means that all pregnant women have access to functioning facilities. The current EmONC assessment has revealed that there are 46 comprehensive and 31 basic EmONC. The minimum number of comprehensive EmONC facilities is exceeded by 9. However, there are still gaps in the availability of EmONC facilities and they vary by district. They are widest in Lilongwe (13) and Blantyre (11). BEmONC facilities, with widest gaps are as follows: Lilongwe (17), Blantyre (10) and Mangochi (8). Despite these gaps, there has been an increase in the number of facilities that provide signal functions and there is a need to increase the number of functioning facilities until at least the minimum level is met.

The review has revealed gaps in provision of EmONC signal functions. At least central and district hospitals are capable of providing Comprehensive EmONC. However, health Centers do not have the full capacity to providing Basic EmONC. Some signal functions are not performed such as assisted vaginal delivery and manual vacuum aspirations. This is mostly due to lack of equipment, knowledge, skills, drugs and supplies. Consequently, women who develop obstetrical complications requiring comprehensive EmONC must be taken to a hospital. The lack of access to and availability of emergency obstetric care services contributes to the slow progress in reduction of maternal and neonatal mortality. There is, therefore, a need to upgrade the designated BEmONC centers to function fully as BEmONC facilities.

Several studies have shown the effectiveness of BEmONC; for example, maternal mortality has reduced in Bangladesh by 50% mainly because women have a reliable access to emergency obstetric services. Furthermore, the dramatic reduction of maternal mortality in Europe particularly in Sweden to levels that command no public health attention was largely due to increased access to emergency obstetric services and advances in medical technology. These are testimonies that signify the superiority of EmONC to all other interventions in the fight to reduce maternal mortality.

There is therefore a need to have the actual functionality of any designated EmONC/BEmONC facility. In order to save women with obstetric complications, the health system must have facilities that are equipped, staffed and actually provide EmONC. Midwives must be trained in the provision of basic emergency obstetric care and be provided with the necessary infrastructure, equipment, drugs, supplies and supportive supervision and any other necessary support for them to effectively provide BEmONC functions.

Met need for emergency obstetric care.

Met need is the proportion of women with major direct obstetric complications who are treated in such facilities. Met need for EmOC has been described as one of the most useful indicators of the performance of a health system in meeting women's obstetric needs. The

direct obstetric complications included in this indicator are haemorrhage (ante partum and post partum), prolonged and obstructed labour, postpartum sepsis, complications of abortion, severe pre-eclampsia and eclampsia, ectopic pregnancy and ruptured uterus. The expectation is to have 100% of women suspected to have major direct obstetric complications treated in emergency obstetric care facilities. It was found that the total number of women with major direct obstetric complications that delivered in all facilities was 51% while those that delivered in EmONC facilities was 29% in 2020 assessment.

The figures do not show significant differences with the met need for the previous assessment in 2015. These results reveal that there are still more women out there that are not receiving EmONC services. The goal is that all women who have obstetric complications should receive EmONC, the minimum acceptable level is 100%. To this end, there is a need for the Government to set up targets and embark on interventions to improve the availability and use of obstetric care. The relevance of met need was reiterated by a case report on EmONC in the 2013 WHO World Health Report, which concluded that provision of EmONC, together with a functional patient referral and transportation system, can significantly lower maternal mortality.

Consistent with bottlenecks that have been identified from the review of all the EmONC assessments, some strategies improving the met need, could include improving the quality of care at facilities, eliminating barriers to seeking care and educating the community to recognize complications and the importance of seeking care etc. Record keeping is one of the challenges in health facilities in Malawi. This bottleneck may lead to low Met need because obstetric complications are poorly recorded in registers. In this case, it is advisable to strengthen record keeping in EmONC facilities.

Proportion of births delivered by Caesarean Section

It was found that 2.8% -3.9% of expected births were conducted through caesarean from 2005 to 2020 in EmONC facilities and up to 7.8% in all facilities. This is below the recommended minimum of 5% and means that many women have poor access to surgical

facilities. However, the 2020 assessment has shown an increase in the number of women giving birth by cesarean section. This is an indicator of provision of life-saving services for both mothers and newborns. Despite the lower rates identified, there is an observation that we are experiencing a countrywide epidemic of overuse of caesarean section more especially in central hospitals, in view of practitioners' fear of litigation, local hospital culture and practitioner style as well as loss of obstetric skills among practitioners. However, evidence suggests negative consequences of C/S is increasing. Caesarean section carries increased risks for maternal and neonatal morbidity and mortality due to complications such as postpartum hemorrhage, sepsis etc. There is a need to calculate institutional C/S rate and to review the indications for the caesarean sections that are performed. One approach is to look at the proportion performed for absolute maternal indications, which would almost certainly lead to the woman's death if untreated.

Training, supervision and leadership by senior physicians are important in maintaining standards. Association of obstetricians and gynecologists should encourage the use of evidence-based protocols. In facilities at all levels, routine clinical audits can be used to monitor change, improve practice and maintain a good quality of care; several tools exist to facilitate this process. The infection rate in women who have undergone obstetric surgery is another indicator of the quality of care provided to women.

Direct Obstetric Case Fatality Rate

The direct obstetric case fatality rate is the proportion of women admitted to an EmONC facility with major direct obstetric complications, or who develop such complications after admission, and die before discharge. Maternal death due to direct obstetric complications remains an important health threat for women in Malawi.

The direct obstetric case fatality rate (DOCFR) indicates the ability of facilities to handle obstetric emergencies. And a high DOCFR indicates poor quality of obstetric care. The maximum acceptable level is less than 1%. The review revealed a downward trend in CFR. From 3.4% in 2005 to 1.4% in 2020 in EmONC facilities. The direct obstetric case fatality

rate is included among the EmONC indicators as a relatively crude indicator of quality. In many instances, the CFR indicates that the quality of care is inadequate; however, there may be other explanations. For example, long delays in reaching EmONC facilities can result in a poor status on arrival and delay in receiving appropriate treatment. On the other hand, CEmONC facilities with high direct obstetric case fatality rate are the endpoint of the local referral chain, so that women with the most serious complications are sent there.

The major direct causes of maternal deaths continue to be those for which effective life-saving interventions are available. Midwives and other skilled attendants therefore have a major role to play in an effort to further reduce these undesirable rates of maternal and newborn morbidity and mortality. There is a need to find ways to promote and enhance the role of midwives as essential providers of skilled care within an enabling environment of care.

Critical review of the EmONC assessment reports indicates a high CFR but does not show how women with emergency obstetric complications are managed and generally handled. Therefore, it becomes difficult to link the increased CFR to quality of obstetric care; it is imperative to conduct a study to find out major issues related to management of emergency obstetric complications.

Most common causes of Direct cases of maternal mortality

The review of EmONC assessments conducted in the past 15 years has shown that Postpartum haemorrhage (PPH) remains the leading cause of maternal deaths in Malawi. It accounted for 33%, 32% and 25% in 2010, 2015 and 2020 of all direct causes of maternal deaths respectively. The other leading direct cause of maternal deaths was severe pre-eclampsia/eclampsia which registered 7%, 16% and 14 % in 2010, 2015 and 2020 respectively. Postpartum sepsis was another direct cause of maternal deaths at 12%, 19% and 12% in 2010, 2025 and 2020 respectively. Similarly, midwives in the visited facilities alluded to similar complications being common and responsible for maternal deaths. However, the review of EmONC services has revealed a better performance of EmONC signal functions. Successful aversion of deaths is dependent on availability and usability of signal functions for

emergency obstetric and neonatal care. This finding means that there is more that relates to the occurrence, diagnosis, management and care of these obstetric complications.

Overview of EmONC signal functions

Global health experts have identified signal functions for Emergency Obstetric and Newborn Care (EmONC) as the most effective medical intervention for managing direct maternal complications and improving maternal survival. However, this requires adequate drugs, supplies, equipment, infrastructure and trained staff to competently diagnose and treat complications and equitably distribute health facilities to cater for the needs of populations. The review indicated higher performance of signal functions such as parenteral oxytocin, parenteral antibiotics, parenteral anticonvulsants and others in both 2015 and 2020. Despite evidence of the signal functions being the effective medical intervention for managing obstetric complications, maternal mortality and morbidity remains a challenge in Malawi.

Many women continue to die due to unpredictable but preventable obstetric complications such as hemorrhage, pre-eclampsia/eclampsia, ruptured uterus, sepsis, and retained placenta. This scenario points to the fact that equipment, staff, infrastructure, drugs and supplies are important predictors of the level of preparedness for a health facility to manage obstetric emergencies using signal functions. Most signal functions are provided by midwives. However, there are no reports on midwives' adherence to the standards on performance of the signal functions. Such information is useful because it identifies the link with outcomes and also the critical functions that are not performed to standards. These could inform quality improvement efforts for the midwives. A study revealed overwhelming and chilling results where the quality of obstetric and midwifery care was generally poor and women were not managed according to the established obstetric guidelines and protocols (Chodzaza, 2008). Inappropriate management of complications and untimely care in hospitals, even for life threatening complications could also explain the current situation.

The assessment reports indicate there are some signal functions that were often missed. These include assisted vaginal deliveries, parental anticonvulsants, removal of retained products of conception and manual removal of placenta. These are lifesaving procedures, and they need not be missed in order to save the women. Midwives should be provided with the enabling environment to provide some of these services that are within their scope of practice. Some midwives do not feel competent in performing procedures like manual removal of placenta and there is a need to put deliberate efforts to support them.

Lack of trainings, refresher courses and supervision for midwives

In addition to the firm educational foundation for practice that midwives receive, improvements in maternal and newborn health come about when midwives receive ongoing support for their work (supportive supervision and continued education). Improvements may also come about when there are effective systems in place that create a positive practice environment for midwifery services. Midwives expressed concern over lack of in-service trainings, refresher courses in obstetric care, lack of supportive supervision and uncondusive working environments.

However, one way to deal with the above situation is through the team system that is available for midwives in central hospitals and some district/health Centre facilities. Working in teams has been identified as an efficient way of organizing midwives to provide maternal and neonatal care services. Team system includes all cadres (RNM, NMT and CMAs) and it helps with mentorship as some midwives are well experienced while others are newly qualified.

It was generally noted that there is inadequate collaboration and alliance between health Centre and district hospital midwives as well as district and central hospital midwives. Therefore, midwives at all levels of care expressed the need for adequate peer support and a mechanism to share knowledge and mentorship on particularly difficult cases.

Midwives mostly depend more on the knowledge they got from school, and they might have forgotten some of the things. Most importantly, a lot of new management issues in obstetrics are emerging which they need to be well versed with. Continued competency for practice requires that midwives engage in an ongoing process of inquiry and lifelong learning. Midwifery supervisors seem not to have put in place mechanisms for promoting continued professional development and a continuous quality improvement process. However, at one district facility, participants indicated that they provide capacity building through in-service trainings, see and learn tours to central hospitals and mentorship sessions. The district, however, could not share the training plan.

Midwives expressed that they often practice without supervisor support that could normally help them reflect on their performance in relation to established standards of practice. Supervision is important as it helps to maintain and improve provider competence and confidence to perform lifesaving obstetric care. Furthermore, it monitors performance and ensures safety and quality obstetric care services. The problem of lack of trainings is compounded by lack of supervision. Midwives interviewed expressed concern over lack of supervision, lack of recognition and appraisal and that there is no motivation to work. Although midwives work independently in challenging situations, there are benefits to midwives as well as mothers and babies, when midwives are supported in practice by supervisors. The midwives that were interviewed argued that they would provide higher level of care when they were nurtured, developed and empowered. Therefore, supervision including case audits implemented as priority interventions in the health facilities would ensure appropriate management of mothers and babies.

Some midwives reported that they had attended BEmONC trainings while others did not. They preferred trainings being conducted outside their duty station compared to onsite trainings which are more sustainable.

Inadequate availability of drugs, equipment and supplies for EmONC

Availability of adequate essential drugs, equipment and supplies is one of the most crucial indicators of a health facility's effectiveness and a prerequisite for providing quality emergency obstetric care. Mostly, poor quality of obstetric care is provided due to health systems failures manifested through operational difficulties such as shortage of essential drugs, lack of equipment and supplies. Even if facilities would have adequate and competent staff, they cannot effectively manage patients with obstetric complications when essential resources are not adequate.

Findings from the review of EmONC reports and interviews held with midwives generally indicate shortages of medicines, equipment and supplies in Malawian health facilities. All EmONC assessment reports and data from interviews showed that key medicines such as hydralazine, misoprostol, nifedipine, oxytocin and magnesium sulphate are out of stock at a certain point in time. The shortages are mostly as a consequence of low budget allocation and poor distribution from the central medical stores.

Similarly, interviews held with midwives revealed that there is erratic supply of drugs, equipment and supplies for treatment of emergency obstetric complications. All health facilities visited reported a lack or erratic supply of some essential equipment, drugs and supplies. Further, some of the equipment was not in working condition. Adequate equipment and supplies are essential for provision of quality emergency obstetric care.

The facilities reported available mechanisms to check availability of supplies and drugs at the central medical stores including the following: pharmacy team meetings every 2 months to check stocks; linking up with reproductive health directorate to provide supplies and a WhatsApp group to provide daily update on blood availability at national level.

There is a need to strengthen supply chain management (including capacity building) and ensure timely procurement of drugs/supplies and equipment. Provision of enabling environment could improve performance of EmONC signal functions by all cadres of health workers including midwives.

Barriers and bottlenecks in Referral System

A well-functioning and effective referral system at all levels plays a pivotal role in improving life-saving care for reducing maternal and neonatal deaths and morbidities. The review indicated consistent challenges related to referral systems across all the years of EmONC assessments. There is still a lack of functioning two-way radio, lack of cell phone owned by facilities as well as lack of motor vehicle ambulances.

The interviews with midwives also revealed that patients are referred from primary to secondary level, and then from secondary to the tertiary level. The districts have been divided into health areas where each area is provided with an ambulance for the evacuation of patients from one facility to another. Ideally, all obstetric emergencies are to be promptly provided with ambulance services when needed. Practically, there are times that an ambulance is not available to transport emergencies to the next level of care. It is not uncommon for an obstetric emergency requiring ambulance services to resort to using other means of transportation from one facility to another because the ambulance at the facility of contact is not available. This may be due to the fact that the ambulance is away on other errands, has ran out of fuel or has a mechanical breakdown. These are some of the practical issues faced by the referral system in the facilities visited.

It was also reported that calls are quickly made to and from referral or receiving facilities regarding patients to enable life-saving preparations and interventions be made. Midwives in the health facilities use either personal mobile phones or the ones designated in the maternity and neonatal care units and ensure airtime availability for the mobile phones. The communication is mostly through WhatsApp groups with referral facilities which is sometimes not effective due to nonresponse and therefore patients may be referred without prior communication. The condition of the patient to be referred is presented on the group, discussions and guidance on management are also shared on the same. The facilities reported that they use standard referral forms, but they do not receive feedback only when there is a bad outcome.

The health system should be responsive enough to establish a dynamic referral system. Such a system needs other systems such as road networks, communications and logistics to be functional and effective. etc. There is need to ensure a functioning referral system that operates 24 hours per day, 7 days per week to facilitate transport and communication from the community to the health Centre and hospital. The referral system must be supervised and accountable, with a policy that supports timely transfer of women that require emergency care. There is also a need to put in place guidelines for monitoring quality assurance. This will help to reduce the delays in reaching appropriate medical facilities where women can receive appropriate obstetric care to prevent maternal and neonatal mortality and morbidity.

The EmONC services provided by midwives ensure that there is decreased maternal and neonatal mortality rates and increased satisfaction with quality of care. Therefore, midwives would work better and contribute towards reduction of maternal and neonatal mortality when there are effective systems in place that create a positive practice environment for midwifery services.

The 2020 draft EmONC report indicates that targeted antenatal care services were provided by 98% of the facilities, 97% provided postnatal care (PNC), 98% provided diagnosis and treatment of sexually transmitted infections (STIs), 86% provided family planning services and 98% of facilities provided PMTCT. This indicates an increase in the performance of these services. However, the increase in coverage often has not translated in the expected reduction of maternal and newborn mortality and stillbirths. This is due to inadequacies in the quality of care provided in health facilities. The evidence shows that high maternal, perinatal, neonatal and child mortality rates are associated with inadequate and poor-quality health services. Evidence also suggests that explicit, evidence-based and cost-effective packages of interventions can improve the processes and outcomes of health care when appropriately implemented (Klaic, M. et al, 2022). There is therefore a need to assess the quality of the services, link with the outcomes and implement the necessary strategies to help reduce the maternal and neonatal mortalities and morbidities.

Implications for the Re-Visioning EmONC Global Process Domain 1

Equitably Distributed and Accessible Supply of Well-Functioning EmONC Facilities

Availability of EmONC services at basic, comprehensive and intensive levels of care is critical in management of emergencies in women and newborn babies globally.

Availability of EmONC

1. Basic EmONC:

There is a need to strengthen referral systems:

- a. The global community needs to prioritize funding resources that could help to establish more basic EmONC facilities in countries or underserved communities where maternal and neonatal mortality rates are high due to dysfunctional referral systems. This will help to reduce disparities in accessing EmONC services in the underserved areas.
- b. In order to enhance effective referrals and reduce interruptions in the continuum of care for both women and newborn babies, global initiatives should focus on improving the dysfunctional referral system. Among other things, this can be done by strengthening referral transportation, communication systems, and community awareness.
- c. The global community should ensure that basic EmONC facilities are equipped with all necessary resources such as equipment, drugs, supplies and blood to aid effective management of emergencies. These will help health workers to effectively manage women and newborn babies with emergencies even in times of delayed referrals.
- d. There is a need for improved roads and transportation infrastructure to facilitate timely and safe referrals of women and newborn babies with emergencies especially in underserved communities. To do this, there is a need to invest in

safe and well-equipped ambulance services and allocate them to rural areas to aid referrals.

- e. There is a need for skilled escorts, who are able to make necessary decisions as needs arise and who are also able to offer continuous care and monitor the health of the mother and newborn throughout the labor and delivery process. These escorts could be midwives, clinicians, or doctors. The skilled escort in EMONC plays an essential role in recognizing, managing, and preventing complications, thereby increasing the chances of a safe and successful childbirth experience.

Education and Training:

- Training and capacity-building activities for healthcare workers in basic EmONC health facilities should emphasize emergency obstetric and neonatal care treatment. This is because, most basic EmONC health facilities are located in areas where referral is either delayed or impossible.
- Develop and implement thorough safety protocols and training programs for health care professionals such as midwives and clinicians who are involved in the referral process.
- Adopt and use efficient methods for informing healthcare professionals about the revised EmONC guidelines or standard operating procedures that can help them effectively manage women and their newborn babies. This can be achieved by putting in place training programs specifically to educate healthcare workers on the correct implementation of the revised guidelines.

Mentorship and Peer Support:

- Establish mentorship programs in rural/underserved areas so that experienced skilled health workers can guide and support their colleagues

who have less skills. Peer support can boost confidence and improve the quality of care provided.

- **Regular Clinical Supervision:** Implement regular clinical supervision and feedback mechanisms to provide health workers with constructive guidance and assurance in their clinical practices. This can help identify areas where confidence is lacking and address them proactively.

Strengthening information, communication and technology system

- Reinforce integration of ICT to facilitate remote consultation and decision-making between BEmONC and CEmONC facilities in cases where immediate referral is not feasible. For example, there will be a possibility to do consultations via phone call, WhatsApp or telemessaging. ICT platforms can aid communication among healthcare facilities and enhance patient management.
- Engage communities so that they understand challenges faced by BEmONC facilities especially those that hinder effective referral process. Community engagement will instill a sense of community responsibility to support referral efforts during emergencies.

Health workers' well-being

Rotation and Rest Periods: Implement rotation schedules and Mandatory rest periods to prevent health care providers from experiencing prolonged periods of intense work. These measures can help mitigate fatigue and burnout.

2. Comprehensive EmONC

- a. There is a need to expand availability of comprehensive EmONC services in both urban and rural settings that are affected by dysfunctional referral system to ensure that EmONC services are accessible to women and newborn babies.

3. Intensive EmONC

- a. There is a need to expand availability of intensive EmONC facilities in regions where referral systems are unreliable to provide immediate life saving care.
- b. Intensive EmONC facilities should be equipped with highly specialized staff and resources and resources to handle complex cases that may arise due to referral systems disruptions.

4. Overall EmONC:

- The re-visioned EmONC process should include a strong focus on strengthening the overall healthcare infrastructure, especially in areas affected by dysfunctional referral systems. Develop and implement guidelines and protocols for EmONC facilities to manage emergencies when referral is not feasible to ensure there is continuity of care.
- Ensure that EmONC facilities are equipped with the necessary equipment, drugs, and supplies, including blood, to function effectively even in the absence of immediate referrals.
- Reinforce integration of ICT to facilitate remote consultation and decision-making among different levels of care (i.e., BEmONC, CEmONC and Intensive care facilities) in cases where immediate referral is not feasible. For example, consultations could be done via phone call, WhatsApp or tele-messaging. ICT platforms can aid communication among healthcare facilities and enhance patient management.
- Establish a robust routine health information system to track and manage basic EmONC services and identify areas for improvement.
- Enhance continuous education and professional development programs at all levels of EmONC in order to instill the culture of continuous education and professional development among health workers. This will enhance

skills necessary for management of emergencies in women and newborn babies.

- Collaboration among partners in maternal and newborn care is paramount in provision of EmONC services. Healthcare providers at facility level, national and international organizations working on maternal and newborn care need to collaborate to ensure that comprehensive EmONC facilities are accessible to women and newborn babies and are functional. Collaboration should also include means on how to improve referrals from BEmONC facilities to intensive facilities in order to bridge the gaps in comprehensive or intensive EmONC availability. Collaboration among partners will help to mobilize resources and technical assistance for addressing resources required in EmONC facilities.
- Monitoring and evaluation of EmONC services is essential to maintain the quality and functionality of comprehensive EmONC centers. At all EmONC levels, there is a need to establish or enhance a routine health information and communication system to track and manage EmONC services and identify areas for improvement at a facility or across levels.

Domain 2

People-Centeredness of the EmONC System

People-centeredness in the context of the EmONC system refers to a healthcare approach that prioritizes the needs, preferences, and well-being of pregnant individuals, newborns, and their families. This approach recognizes that effective maternal and neonatal care not only involves clinical procedures but also considers the emotional, social, and cultural aspects of care recipients.

Implications:

The EmONC Global Process should work towards a more people-centered, efficient, and supportive healthcare system that benefits both patients and healthcare workers, ultimately reducing maternal and neonatal morbidity and mortality rates. Therefore, there is need for a people centered EmONC system to:

- Be culturally sensitive and respectful of the diverse backgrounds and beliefs of the women seeking care. This implies training healthcare providers to be culturally competent and respectful, acknowledging and accommodating cultural practices and preferences.
- Prioritize community-based health education through extensive outreach and partnerships with local leaders and organizations to raise awareness about the importance of seeking care during pregnancy and childbirth.
- Prioritize the establishment of robust monitoring and evaluation systems to continually assess its effectiveness, enabling ongoing assessments to identify areas for improvement and maintain responsiveness to evolving requirements.
- Establish comprehensive training programs in EmONC for healthcare providers across all levels of the healthcare system, along with capacity-building initiatives, to empower healthcare workers to provide high-quality, people-centered care.

Specific levels of the health system in Malawi

Health services in Malawi are delivered through three levels of care, namely: primary, secondary and tertiary. Primary health care (PHC) is organized to meet basic health needs of communities. District hospitals constitute the secondary level of the health care system, where facilities are enhanced by the provision of adequate specialized supportive services. Tertiary health care consists of highly specialized services provided by central hospitals and other specialist hospitals.

Most health services in Malawi (60%) are offered through government hospitals and clinics that are allegedly free; the remainder of care is offered through mission hospitals and private clinics (40%) that require payment. Malawi's health system is affected by severe lack of physical, financial, and human resources ([Chimwaza et al., 2014](#)) and high dependency on donor funds ([Kanyuka et al., 2016](#)), which means adopting donors' targets, including those concerning RMC.

Implications:

There is a compelling urgency for the EmONC Global Process to prioritize the enhancement of care quality, infrastructure improvement, and healthcare system strengthening at all levels of the health system. This will ensure that mothers and their infants receive highest level of maternal and newborn care, ultimately leading to improved healthcare access and outcomes for everyone. As such, the EmONC system must:

- Ensure that women are directed to suitable levels of the healthcare system, which entails strengthening referral systems to facilitate the transfer of women to higher-level facilities when required. At the same time lower-level facilities should also be empowered to competently manage common complications.
- Establish care coordination mechanisms to facilitate a smooth transition of care across various health system levels. This coordination among others would involve the utilization of digital health records and standardized protocols to streamline the exchange of patient information and treatment plans.
- Institute feedback mechanisms within the referral system to oversee patient experience and identify areas for improvement. This entails developing mechanisms for both patients and healthcare workers to offer feedback on the referral process and the quality of care provided.
- Ensure that healthcare workers across all health system levels receive sufficient training in emergency obstetric and neonatal care. This would necessitate

ongoing training programs for healthcare providers to sustain and enhance their skills, especially in managing childbirth complications.

- Place strong emphasis on thorough data collection and analysis to monitor patient care-seeking patterns. This data can be instrumental in customizing EmONC services to align with the specific needs and preferences of the communities being served.
- Utilize data for informed decision-making and the identification of areas where the referral system may encounter challenges. Therefore, there is need for ongoing data collection and analysis to evaluate intervention effectiveness and steer improvements in the referral process.

Active patient care-seeking (where are women seeking care? where are women being sent to receive care? etc.)

CEmONC & Tertiary hospitals

Government policies in Malawi heavily influence the healthcare landscape for expectant mothers, prioritizing the utilization of health facilities for childbirth. These policies are designed to enhance maternal and newborn health outcomes by ensuring access to skilled birth attendants and advocating for safe delivery practices. The Malawian government has undertaken significant efforts to educate women on the importance of seeking care from skilled birth attendants, such as midwives and trained healthcare professionals during pregnancy and childbirth. This emphasis aligns with global initiatives aimed at reducing maternal and neonatal mortality rates for safe delivery practices.

Additionally, the government has implemented birth policies that promote facility-based deliveries, recognizing their association with better outcomes in terms of maternal and newborn health. To support this, measures have been put in place to enhance the accessibility and affordability of healthcare facilities. Consequently, there has been a

notable increase in facility-based deliveries in the country, contributing to an overall improvement in the quality of maternal and neonatal care in Malawi.

Despite the provision of free maternity care, concerns have been raised about the quality of services offered (Leslie, Fink, National Statistics Office, & Kruk, 2016; Ministry of Health [MoH] & ICF International, 2014). The healthcare landscape is characterized by health centers primarily providing basic emergency obstetric and newborn care (EmONC), with only a limited number of referral hospitals equipped to deliver comprehensive EmONC services.

Implications

The EmONC Global process should recognize the urgent need to promote proactive patient care-seeking; consequently, EmONC systems should prioritize healthcare facility accessibility through investments in infrastructure, transportation networks, and telecommunication solutions. This would ensure convenient access to care, especially in remote or underserved areas.

Hence, the EmONC system must: address the financial aspect of care-seeking by implementing measures such as health insurance coverage, subsidies, or cash transfer programs to mitigate financial barriers. The system must also ensure that the cost does not hinder women from accessing care.

Engage in community outreach and education programs aimed at enhancing care-seeking behaviors. This would include creating partnerships with community organizations and influencers to raise awareness about the referral system, maternal and neonatal care, and the importance of timely care-seeking and provision. Place a strong emphasis on refining the referral system to ensure that women seeking care are directed promptly and accurately to the appropriate levels of the health system. This would simplify referral pathways, enhance communication between BEmONC and CEmONC facilities, and provide effective training to healthcare workers on the use of the referral system.

Highlight the importance of robust data collection and analysis to monitor patient care-seeking patterns. This data can be instrumental in customizing EmONC services to align with the unique needs and preferences of the communities being served.

Care experience for women and newborns.

A positive pregnancy experience is characterized by several key elements. Firstly, it involves maintaining physical and sociocultural normality, ensuring that the mother feels physically well and supported within the context of her cultural and social surroundings. Additionally, it encompasses the preservation of a healthy pregnancy for both the mother and the baby, including the prevention and treatment of any potential risks, illnesses, or life-threatening situations. Moreover, a positive pregnancy experience focuses on achieving a smooth and effective transition to labor and birth, minimizing unnecessary stress and complications.

Finally, it encompasses the journey towards positive motherhood, where maternal self-esteem, competence, and autonomy are promoted, enabling the expectant mother to embrace her role with confidence and a sense of empowerment. The 2016 WHO ANC model is designed to offer pregnant women a comprehensive and person-centered approach to their care. Its primary goal is to ensure that every interaction during the antenatal period is characterized by respect and individualized attention.

Implications:

The EmONC Global Process should focus on enriching the experience of care for women and newborns by fostering compassionate care, implementing mechanisms to assess care quality and gathering patient feedback. The experience of care can also be enriched by advancing cultural competence and patient-centered policies to improve the overall birthing experience.

As such the EmONC system must:

- Engage in effective communication with patients which would ensure a clear understanding of their condition, treatment options, and potential risks. Health care providers are therefore supposed to possess in patient-centered communication skills to empower women to make informed decisions regarding their care.
- Establish avenues for women to openly share their experiences, with the EmONC system. Healthcare workers should demonstrate responsiveness to the feedback and implement necessary improvements accordingly to ensure that women have a smooth and efficient transition to labor and birth. This would help to reduce stress and complications, especially in emergency situations where expert management is vital for addressing potential life-threatening issues promptly.
- Offer women respectful and dignified care during childbirth while rendering a proactive approach to tackle and prevent issues such as mistreatment, discrimination, and abuse that could potentially occur in this crucial phase of healthcare.
- Actively involve communities by engaging them in decisions related to the planning and delivery of EmONC services. This would help in the creation of community advisory boards or committees to ensure that the healthcare system aligns with the preferences and expectations of the local population.
- Foster shared decision-making by encouraging open dialogues and respecting women's choices. This entails emphasizing informed consent, discussing treatment options, and actively involving women in decisions regarding their care during pregnancy and childbirth.

- **Champion Respectful Maternity Care:** emphasize the importance of providing women with dignified and respectful care during childbirth and actively address and prevent issues such as mistreatment, discrimination, and abuse.
- Consider implementing policies and practices that allow the presence of companions, doulas, or midwives to provide vital emotional support, while simultaneously recognizing and integrating psychosocial support services to address the emotional and psychological aspects of care. This is particularly important for women experiencing stress, anxiety, or trauma during pregnancy and childbirth.

Health workforce wellbeing

Health workforce wellbeing is a critical component of a resilient and effective healthcare system. It encompasses the physical, mental, and emotional health of healthcare professionals who play a pivotal role in providing quality care. Ensuring the wellbeing of the health workforce is essential not only for their own sake but also for the wellbeing of patients and the overall healthcare system. It involves providing support mechanisms, such as mental health services, stress management programs, and work-life balance initiatives to help healthcare providers cope with the demanding nature of their work. Additionally, addressing issues like burnout, job-related stress, and workplace violence is vital to maintaining a motivated and skilled healthcare workforce. By prioritizing health workforce wellbeing, healthcare systems can enhance their resilience, attract and retain talent, and ultimately deliver better care to the communities they serve.

The EmONC Global Process should prioritize the mental health and emotional wellbeing of healthcare workers in the EmONC system by establishing mental health programs, counseling services, and stress management initiatives to help healthcare workers cope with the challenges of their work.

As such, the EmONC system must:

- Address the psychological challenges associated with high-stress work environments by offering mental health support, counseling, and resilience-building programs for healthcare workers to effectively alleviate burnout and emotional distress. The system must also create safety nets by offering debriefing sessions, peer support networks, and access to counseling services to help colleagues cope with the emotional challenges of their work, particularly when dealing with distressing cases or adverse outcomes.
- Create recognition and rewards initiatives that honor the dedication and efforts of those in the field of EmONC. Healthcare workers could be offered some incentives, awards, and career growth prospects to enhance both their morale and retention.
- Promote a healthy work-life balance among healthcare professionals through the implementation of policies that restrict excessive working hours. This could be done by ensuring sufficient rest intervals, and flexibility in scheduling when feasible.
- Invest in continuous training and skill development for healthcare workers through ongoing education and professional development opportunities to ensure that the healthcare workers are well-equipped to provide high-quality EmONC services.
- Create peer support networks within the healthcare workforce to provide emotional support and a sense of community through regular peer discussions, mentorship programs, and opportunities for healthcare workers to share experiences and advice. It would also be necessary to develop resilience-building programs that will help healthcare workers navigate stressful situations and develop coping strategies including self-care practices.

- Prioritize the provision of safe and supportive working environments for healthcare workers by addressing concerns such as workplace violence, harassment, and ensuring the availability of essential safety measures and equipment.
- Ensure that healthcare professionals have access to healthcare services for themselves and their families, including healthcare coverage, regular health check-ups, and preventive care.
- Establish feedback mechanisms for healthcare workers to express their concerns and provide input on improving their working conditions. This can be achieved by creating a culture of open communication and responsiveness to feedback. There will also be need to foster a collaborative and supportive team environment that promotes teamwork, effective communication, and shared responsibilities among healthcare workers to reduce the burden on individuals.
- Engage in advocacy efforts to influence policies that impact healthcare workers' wellbeing. Among others this will entail collaborating with healthcare organizations and policymakers to advocate for better working conditions, fair compensation, and supportive policies.
- Participate in advocacy initiatives aimed at influencing policies affecting healthcare workers' wellbeing by collaborating with healthcare organizations and policymakers to champion improved working conditions, equitable compensation, and supportive policy changes.
- Promote research on healthcare workers' wellbeing to gain deeper insights into the challenges they encounter and to create evidence-based strategies that address healthcare workers' satisfaction, mitigate burnout rates, enhance

retention, and inform the development of effective policies and programs. Therefore, there is need to provide leadership training for healthcare managers and supervisors to establish a culture of supportive and empathetic leadership that will equip leaders with the ability to identify and address the wellbeing needs of their teams.

Domain 3

The Effectiveness of EmONC Services

In this domain, we explore beyond mere service coverage, as we delve deep into the clinical appropriateness of care, the quality of care delivered, and the far-reaching impact of this care on the lives of mothers and neonates. By scrutinizing these multifaceted aspects, we aim to shed light on implications and the important role that EmONC services play in safeguarding maternal and neonatal health, thereby informing the ongoing re-visioning process for EmONC on a global scale.

Service Coverage

- There should be a global commitment to service coverage to ensure a commitment to inclusivity and standardization by allocating resources for infrastructure, transportation, and telemedicine to reach underserved areas.
- There is a need to foster collaboration and partnerships with governments, local organizations, and communities to enhance infrastructure, establish transportation networks, and integrate telemedicine within the EmONC framework.
- The global community should come up with mechanisms to raise awareness on the availability and significance of EmONC services through community education initiatives, bridging disparities, and ensuring that essential EmONC services are accessible to all, thus improving maternal and newborn healthcare globally.

Clinical Appropriateness of Care

Ensuring the clinical appropriateness of Emergency Obstetric and Neonatal Care (EmONC) services is paramount for their global effectiveness, and it carries far-reaching implications for policy, practice, and theory, including the following:

Guiding Policy and Clinical Practices for Optimal Maternal and Child Health: The global community should consider championing policy development by advocating for changes at both national and global levels that underpin the principles of clinical appropriateness while discouraging the overuse of certain practices. These policies must be closely aligned with the Sustainable Development Goals that pertain to maternal and child health. Additionally, there is need to prioritize the creation and dissemination of precise clinical guidelines and protocols, which offer guidance to healthcare workers in discerning when cesarean sections or specific practices are clinically appropriate. These guidelines should be firmly rooted in evidence-based medicine and be adaptable to the unique needs of local contexts, thus fostering a universally effective approach to maternal and child healthcare.

Monitoring and Data Collection: Establish robust monitoring and data collection systems to track rates of cesarean sections, oxytocin use, and other medical interventions. This data can be used to identify trends and areas where clinical appropriateness may be compromised.

Enhancing Healthcare Provider Capacity and Expertise: The global community should invest in training and capacity building for healthcare workers to enhance their clinical decision-making skills with a strong emphasis on clinical appropriateness, aiming to reduce overuse and underuse of practices. Additionally, resources should be allocated for continuous education and skill enhancement programs to keep healthcare providers updated with the latest clinical guidelines and best practices, ultimately boosting their confidence and their ability to maintain professional standards. Furthermore, the global community should establish mentorship and clinical supervision programs that pair experienced healthcare workers with those in need of support. This would provide

invaluable guidance and on-the-job learning to enhance healthcare workers' confidence and competence.

Healthcare Worker Accountability and interdisciplinary collaboration: The global community should hold healthcare workers accountable for their clinical decisions, particularly in cases where overuse or underuse of certain practices is identified to discourage unnecessary medicalization. Additionally, there is a need to promote interdisciplinary collaboration among healthcare professionals, including obstetricians, midwives, nurses, and others. Such collaboration will ensure that clinic decisions are made collectively, taking into consideration the best interests of the patients.

Risk Management and Feedback: Establish non-punitive systems for reporting adverse outcomes and near misses. The feedback will be used to improve clinical practices and ensure that healthcare workers are not unduly punished for unintended errors.

Quality of Care

- Improving the quality of EmONC services involves the development and implementation of standardized protocols, which should be disseminated widely and updated regularly to reflect the latest best practices.
- The global community should establish systems for continuous monitoring and evaluation of care quality, including regular audits and clinical assessments.
- There has to be active collection and incorporation of patient feedback into care improvement processes. This will ensure that EmONC services consistently provide the highest quality care to expectant mothers and newborns worldwide, ultimately reducing maternal and neonatal mortality rates.
- There is a need to prioritize patient-centered care, encompassing both respectful treatment and effective communication as fundamental pillars of healthcare provision.

Improving the Quality of Care and Fostering Patient-Centered Services

- There is a need to improve the quality of EmONC services that necessitates the development and implementation of standardized protocols. This must be widely disseminated and continually updated to align with the latest best practices.
- The global community should consider establishing systems for continuous monitoring and evaluation of care quality, including routine audits and clinical assessments.
- There is a critical need to actively collect and incorporate patient feedback into care improvement processes. Importantly, the advancement of patient-centered care is a central element of these improvements. It involves not only the enhancement of clinical standards but also prioritizes the experience of women receiving care. In the long run, this ensures respectful treatment and effective communication, thereby addressing the concerns of those who may have felt neglected in the past.

Impact of Care

- There is a need to put emphasis on systematic collection and analysis of data on maternal and neonatal outcomes. This data should inform decision-making and resource allocation.
- Preventable mortality reduction efforts should focus on identifying and prioritizing interventions that can reduce avoidable deaths based on data and evidence.
- Long-term follow-up programs should be established to ensure the ongoing health and well-being of mothers and newborns who have received EmONC services to detect and manage potential complications post-discharge. This comprehensive approach to assessing the impact of care will ensure that

EmONC services continue to evolve and deliver the best possible outcomes for expectant mothers and newborns worldwide.

Cost-Effectiveness

Efficient resource allocation is key to achieving cost-effectiveness. There is a pressing need for efficient resource allocation strategies, emphasizing budget and optimization of interventions with the highest impact.

In practice, economic evaluations should be conducted to assess the cost-effectiveness of various EmONC interventions and strategies, with data guiding resource allocation decisions and the optimization of budget utilization. This data-driven approach not only ensures that limited resources are allocated to where they can have the greatest impact but also promotes the optimization of budget utilization. This would greatly contribute to the sustainability and reach of EmONC services, particularly in resource-constrained settings.

Continuous Improvement

- The global community should endeavor to pursue continuous improvement in EmONC services that necessitates the establishment of quality improvement initiatives based on data and feedback from monitoring and audits.
- The global community should encourage research and innovation in the field of EmONC as being essential to identify new approaches, technologies, and interventions that can improve effectiveness. This involves funding and supporting research projects that can drive innovation and advance care in the field.

Conclusion

The project on Re-Visioning EmONC was set out to gather information and recommendations from EmONC health providers, district and national planners and other key stakeholders in Malawi on how to update and improve the current global EmONC

framework and EmONC indicators. We used qualitative approach, applying human-centered design (HCD) methods, to meet the research objectives. Overall, between 64 health system actors participated in the FGDs or interviews. The study has identified significant insights that impact provision of obstetric and neonatal care. Technical feedback on past Emergency obstetric and neonatal care (EmONC) assessment reports conducted in Malawi from 2005 to 2020 has been provided. The report has also discussed EmONC indicators and their implication on obstetric, midwifery and neonatal practice. Further, a technical report on new EmONC signal functions and indicators ('ground truthing' of indicators). Recommendations from Malawi have been incorporated into the global Re-Visioning EmONC.

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Appendices

Appendix I: Participant Information Sheet

Study Title: Re-Visioning Basic Emergency Obstetric and Newborn Care: The Case of Malawi.

Dear Participant,

We are lecturers at Kamuzu University of Health Sciences with our colleagues from the Columbia University, United states of America currently conducting a research study on Re-Visioning Basic Emergency Obstetric and Newborn Care: The Case of Malawi. This is to inform you that we would like you to participate in a research study indicated.

The study will learn how to make the EmONC framework and EmONC indicators (and guidance) more useful for planning, implementing and monitoring good-quality, equitable health services that effectively prevent, identify and clinically manage maternal and newborn complications. The study will take place in three district hospitals including 2 to 3 BeMONC health Centers within their catchment areas. The information will assist the researchers to review, rethink, and revise the EmONC framework and indicators. The information will also reinforce appropriate interventions that would assist women during pregnancy, labour and childbirth to reduce maternal and neonatal mortality.

You have been selected to participate in the study because you are a stakeholder who is involved in the provision of EmONC services and/or you monitor performance of EmONC services.

You will be involved if you are willing to participate in the study. You can choose to participate in the study or not. You may withdraw from participating at any time you feel so and there will be no penalty.

The study will follow procedures approved by the appropriate research committees from College of Medicine of Malawi and the various participating district hospitals.

There are no risks anticipated if you participate in the study and you are free to choose the questions you want to respond to or you are comfortable to provide the information for.

The procedure will involve focus group discussions and in-depth interviews from a semi-structured Interview guide that would take about 40 to 60 minutes. Both audio and visual

privacy will be maintained at all times. The information obtained will be anonymous and confidential and will be kept at a secure place by the researchers.

You are free to choose to participate in the study and refusal to take part involves no penalty neither will it infringe your right to access health services at the health centre. You are allowed to discontinue participating in the study at any time without loss of benefits.

Findings of the study will be accessible to you for your benefit to have information on revised EmONC framework and indicators.

You are free to ask for clarity of any information regarding the research whenever necessary from the following:

Elizabeth Chodzaza,
Kamuzu University of Health Sciences, P/Bag 360,
Blantyre, Malawi. Telephone number+ 265(0) 888333891,
Email address: echodzaza@kuhes.ac.mw

COMREC Secretariat,
Kamuzu University of Health Sciences,
Research and Ethics Committee,
Private Bag 360, Chichiri, Blantyre 3
Telephone number + 265 (0) 1871911
Email: address comrec@kuhes.ac.mw;
COMREC Chairperson; telephone number 0888118993

Thank you for considering participating in the study.

Yours Faithfully,

Elizabeth Chodzaza, PhD

Principal Investigator

Appendix II: Consent Form for Midwives

STUDY TITLE: Re-Visioning Basic Emergency Obstetric and Newborn Care: The Case of Malawi.

I understand that I will be part of a research study focusing on “Re-Visioning Basic Emergency

Obstetric and Newborn Care: The Case of Malawi.” I understand that the information obtained will be used to improve maternal and neonatal outcomes through timely and appropriate management of emergency obstetric complications. There are no direct benefits to me as a result of my participation in this study. However, transport, accommodation and meal costs will be reimbursed at K130,000.00.

I willingly give consent to be interviewed and participate in group workshops to provide information on how emergency obstetric care is provided in Malawi so that there can be improvement in maternal and neonatal outcomes in Malawi.

I have been informed that my name or other identifying information will not appear on any forms and will not be used when results are presented.

I have been informed that I will be recorded, photographed and/or filmed and that the records will be kept in a secure way and only used for the purposes of the research. I give permission to be photographed or audio recorded and understand that the photographs or any other records will be used in presenting the findings of the study.

The interview and participation in group discussions is entirely voluntary and that I am free to withdraw at any time. My decision whether or not to participate will not affect my healthcare in any way whatsoever.

I understand that the findings obtained during the course of the research will be accessible to me. I voluntarily agree to participate in the study.

Further information regarding this study can be obtained directly from:

Elizabeth Chodzaza,
Kamuzu University of Health Sciences.
Private Bag 360, Chichiri, Blantyre3.
Telephone number +265(o) 888333891
Email address: echodzaza@kuhes.ac.mw

COMREC Secretariat, University of Malawi, College of Medicine and
Research and Ethics Committee, Private Bag 360, Chichiri, Blantyre 3
Telephone number+265 (o) 1871911 Email address: comrec@medcol.mw;
COMREC Chairperson; telephone number 0888118993

I have been given the opportunity to ask questions and of my own free will declare myself
ready to participate in the study.

Participant's name..... Signature/Thumb print.....
Date of recruitment.....; Researcher's signature.....

Appendix III: Consent Form for DHMT and Government Officials

STUDY TITLE: Re-Visioning Basic Emergency Obstetric and Newborn Care: The Case of Malawi.

I understand that I will be part of a research study focusing on “Re-Visioning Basic Emergency Obstetric and Newborn Care: The Case of Malawi.”

I understand that the information obtained will be used to improve maternal and Newborn outcomes through timely and appropriate management of emergency obstetric complications. There are no direct benefits to me as a result of my participation in this study. However, time spent during discussions with DHMT and Government officials, will be compensated for fuel and lunch at K50,000.00.

I willingly give consent to be interviewed and participate in group workshops to provide information on how emergency obstetric care is provided in Malawi so that there can be improvement in the care to assist to improve maternal and Newborn outcomes in Malawi. I have been informed that my name or other identifying information will not appear on any forms and will not be used when results are presented.

I have been informed that I will be recorded, photographed and/or filmed and that the records will be kept in a secure way and only used for the purposes of the research. I give permission to be photographed and understand that the photographs will be used in presenting the findings of the study.

The interview and participation in group discussions is entirely voluntary and that I am free to withdraw at any time. My decision whether or not to participate will not affect my healthcare in any way whatsoever.

I understand that the findings obtained during the course of the research will be accessible to me. I voluntarily agree to participate in the study.

Further information regarding this study can be obtained directly from:

Elizabeth Chodzaza , Kamuzu University of Healthy Sciences. Private Bag 360, Chichiri, Blantyre 3. Telephone number +265 (o) 888 333 891. Email address: echodzaza@kuhes.ac.mw

COMREC secretariat, University of Malawi, College of Medicine and Research and Ethics Committee, Private Bag 360, Chichiri, Blantyre 3. Telephone number +265 (o) 1871911. Email address: comrec@medcol.mw

COMREC Chairperson; telephone number +265 (o) 888 118 993

I have been given the opportunity to ask questions and of my own free will declare myself ready to participate in the study.

Participant's name.....Signature/Thumb print.....

Date of recruitment.....; Researcher's signature.....

Appendix IV: Focus Group Discussion Guide

Group size: 5-7 participants maximum

Themes	Sub-topics	User groups
<p>Persistent challenge in achieving a well-functioning BEmONC level (readiness + performance)</p> <p>Goal: figure out how to focus attention and resources on solutions to persistent health system challenges</p>	<ul style="list-style-type: none"> • There are multiple EmONC assessments pointing out problems; but why do certain problems persist? Do we need to draw attention to other specific underlying issues/challenges/problems that are inhibiting positive change? If yes, what should the new focus be on? What are some new indicators that can provide that lens? Or, are the EmONC assessment data not accessible? Are they only being used by a small group of people at the central level? What problems do midwives / nurses want a spotlight on? • Use the lens of a few signal functions to explore the issues of readiness. <ul style="list-style-type: none"> ◦ Criteria: important/critical in Malawi context; difficulty with performance <ul style="list-style-type: none"> ■ AVD ■ Manual removal of placenta ■ Admin of parenteral anticonvulsants ■ PPH (main cause of death) ■ Care during referral/transport 	<p>Based at BEmONC sites:</p> <ul style="list-style-type: none"> • Nurse midwives • nurse midwife technicians • HF in-charges

	<ul style="list-style-type: none"> • Readiness issues to consider (looking for tracers, which are most important): <ul style="list-style-type: none"> ◦ Staffing ratio and skill mix ◦ Sustainable supplies, equipment ◦ Infrastructure ◦ supervision/ongoing learning ◦ Trust and teamwork ◦ Confidence to perform. ◦ Referral reliability/ transport/ relationship with receiving facility 	
Receiving referrals at CEmONC (also, through the lens of certain SFs?)	<ul style="list-style-type: none"> • Cases that they receive through referrals from BEmONC • Referral protocols/Decisions to refer - how does it work in practice (appropriateness and timeliness) • Relationships between health centers (BEmONC) and hospitals (CEmONC) • Network functioning • Transport and communications reliability • Care during transport 	<ul style="list-style-type: none"> • Hospital-based: <ul style="list-style-type: none"> ◦ Head of hospital maternity ◦ NMs and NMTs • Transport officers • Ambulance drivers
Review and feedback on framework	<ul style="list-style-type: none"> • Usefulness and refinement of existing framework • Feedback on overall new framework (blueprint) • Feedback on revised/ new indicators • At what level are they used/useful 	Program managers or others who have worked with and know the indicators from the: <ul style="list-style-type: none"> • UNFPA • World Health Organization • Reproductive Health directorate • White Ribbon Alliance

Appendix V: Key Informant Interview Guide

[Respondents with experience using the EmOC indicators and framework]

The 2009 “Monitoring emergency obstetric care: A handbook” describes a set of connected indicators [show table of indicators] to measure and monitor the availability, utilization, and quality of emergency obstetric care (EmOC) in low- and middle-income countries. This framework, built around signal functions and the designation of basic and comprehensive levels of EmOC [show table of signal functions], has been enormously influential over the last 30 years. It is now time for the EmOC framework and related indicators to be updated, improved and in some cases expanded to better meet the needs of countries. This will include the full integration of newborn care. This process is being led by AMDD at Columbia University, UNFPA, UNICEF, WHO and the London School of Hygiene and Tropical Medicine.

Critical to the success of the Re-Visioning process will be learning directly from countries about their experiences conducting EmOC assessments and using the EmOC framework and indicators to plan, implement and monitor EmOC services. Therefore, in depth studies are being conducted in three countries to learn directly from people who have used the indicators over the years. Since Malawi has conducted a total of 5 EmOC assessments, centered around the EmOC framework and indicators, it has been selected to be one of the Revisioning EmONC country studies (along with Senegal and Bangladesh).

You have been identified as one of the key people in Malawi with experience using the EmOC framework and indicators and we would like to get your thoughts on how best to improve them.

[Reassure the respondent that we are really interested in her/his opinion and “right” or “wrong” answers are not an issue. Many people may not know the answer to a question, and it is acceptable to simply say you don’t know.]

Basic characteristics:

- What is your current job position and what is your place of employment [if relevant, mark what district they are working in]?
- What is your professional cadre (nurse, doctor, statistician, etc.)?
- How long have you been in this current position?
- What is the nature of your current job?

[Do not ask but note the respondent's gender]:

General questions about the EmOC indicators and framework:

- In your opinion, how have the EmONC indicators been used in Malawi? [Probe: Who uses them, for what purpose?]
- What have you used the EmOC indicators for? What was that experience like?
- Which aspects of the Malawi national (maternal and newborn health / overall health) strategy do you think directly relate to the EmOC indicators?
- How well do the indicators work together as a set? If you are not using all the indicators together, which indicators are you using?
- What picture do they give you of the health system? Is there anything missing? If yes, what?
- How have the indicators or framework been tweaked/adapted for use in Malawi and why?
- What, if any, additional indicators should be added to the set?
- Why?

If yes, what would you suggest adding?

- The goal is to have the revised indicators integrated into the HMIS. What is your experience having the EmOC indicators in the HMIS in Malawi? How has it worked for you? How can the integration of the indicators into the HMIS be improved?
- Individual indicators / components of indicators:
- We would now like to discuss your experiences with the signal functions that underpin the indicators:

EmOC signal functions

- Have you used the EmOC signal functions? Yes/No (if no, skip to the next indicator)
- How have you used the EmONC signal functions?

Please explain how they have been useful to you.

- Have you had any problems using the EmOC signal functions? Please explain your responses
- How accurately do the current signal functions reflect what is going on in your facility / your area in terms of availability of EmONC services? Please explain.
- What would you change about the measurement of the signal functions? Probe: frequency of classification, specific signal functions, how the classification is made, other.
- Why? What would you change?

We would now like to discuss your experiences using the EmOC indicators:

Availability of EmOC: basic & comprehensive facilities

- Have you used this indicator? Yes/No (if no, skip to the next indicator)
- How have you used the availability of EmOC indicator:

Please explain how it has been useful to you.

- Have you had any problems using this indicator?
Please explain your responses:
- Do you think this indicator should be changed? Yes/No
- What would you change about this indicator?

Probes: numerator, denominator, target/acceptable range, how data are collected for the calculation, other. Currently we determine whether a facility is functioning as an EmONC facility by the performance of all the signal functions, at least once, in the last 3 months. Would you like to see a revision as to how an EmONC facility is determined? How would you modify that determination?

- Is the current target reasonable (i.e., 5 EmOC facilities per 500,000 population, including at least 1 comprehensive EmONC facility)? Why or why not?
- Why are there so few fully functioning B-EmONC facilities? What have been the challenges?

Geographic distribution of EmOC facilities

- Have you used this indicator? Yes/No (if no, skip to the next indicator)
- How have you used the geographic distribution of EmOC facilities indicator:
 - Please explain how it has been useful to you.
- Have you had any problems using this indicator?
 - Please explain:
- How well does this indicator help you understand the geographic distribution of EmONC services? Please explain.
- What would you change about this indicator and why?

Probe: numerator, denominator, target/acceptable range, how data are collected for the calculation, other.

Traditionally, this indicator is analyzed the same way as Indicator 1 but stratified by administrative sub-national units. With increasing access to Geographic Information System (GIS), we can be precise about distance and/or travel time. We would like to propose a new indicator (or replace the current one) that measures the proportion of the population with access (defined by travel time) to the nearest EmONC facility.

- What do you think about this new approach to measuring geographic availability?
- Do you have another suggestion?
- What time limit would you suggest (e.g., 30 minutes, 1 hour, 2 hours, other), and why (probe whether there is anything specific to the respondent's context that might influence their response)? If you are unsure, what should the process be to determine the right timeframe? Is the minimum time limit different for maternal complications and newborn complications?
- Should that time be between: communities and any level EmONC facility, communities and CEmONC, facility where births take place and CEmONC facility, facility where births take place and a BEmONC facility?

Proportion of all births in EmOC facilities

- Have you used this indicator? Yes/No (if no, skip to the next indicator)
- How have you used the proportion of all births in EmOC facilities indicator:

Please explain how it has been useful to you.

- Have you had any problems using this indicator?
Please explain your responses:
- If you could make a change to this indicator, what would it be and why?

Met need for EmOC: proportion of women with major direct obstetric complications who are treated in EmOC facilities.

- Have you used this indicator? Yes/No (if no, skip to the next indicator)
- How have you used the met need for EmOC indicator?

Please explain how it has been useful to you.

- Have you had any problems using this indicator?
Please explain your responses:
- How accurately does this indicator reflect what is going on in your area in terms of utilization of EmONC services? Please explain. Probe: how well do registers capture complications? Are complications over or under reported?
- If you could change something about this indicator, what would you change? Probe: numerator, denominator, target/acceptable range, how data are collected for the calculation, other.

Why?

- Is the current target of 100% met need reasonable? Why or why not?

Caesarean sections as a proportion of all births

- Have you used this indicator? Yes/No (if no, skip to the next indicator)
- How have you used the caesarean sections as a proportion of all birth's indicator:

Please explain how it has been useful to you.

- Have you had any problems using this indicator?
Please explain your responses:
- If you could change something about this indicator, what would you change? Probe: numerator, denominator, target/acceptable range, how data are collected for the calculation, other. Why?

In the 2015 WHO Consensus Statement, they recommended only having an upper limit of 10% (changed from 15% and dropping the lower range of 5%). How do you feel about this change? How important is it to set a lower limit?

Increasingly LMICs face soaring CS rates in highly urban areas and very low rates in rural areas. In fact, high CS rates are just one example of “over-medicalization”. Do you have any thoughts on potential indicators that could be used to measure over-medicalization?

Direct obstetric case fatality rate

- Have you used this indicator? Yes/No (if no, skip to the next indicator)
- Have you used it at the facility level or have you aggregated data from multiple facilities to look at the quality of EmONC in a geographic area / network of facilities?
- How have you used the direct obstetric case fatality rate indicator:

Please explain how it has been useful to you.

- Have you had any problems using this indicator? Please explain your responses:
- How accurately does this indicator reflect what is going on in your area or facility in terms of quality of EmONC services? Please explain.
- If you could change something about this indicator, what would you change and why? Probe: target/acceptable range, where data are collected for the calculation, calculating cause specific DOCFR, other.
- Given the trend of deaths increasingly occurring in hospitals, what do you think about restricting the calculation of this indicator to only hospitals? Why?
- If we did, what do you think the hospital DOCFR would tell you/how would you use this information?

Intrapartum and very early neonatal death rate

- Have you used this indicator? Yes/No (if no, skip to the next indicator)
- How have you used the intrapartum and very early neonatal death rate indicator: Please explain how it has been useful to you.
- Have you had any problems using this indicator? Please explain your responses:

If you could make a change to this indicator, what would you change and why? Probe: numerator, denominator, not combining intrapartum stillbirths with very early neonatal deaths, the weight requirement, how data are collected for the calculation, other.

- What are your thoughts on determining a target for this indicator? Is it needed? Would it be useful? Please explain. How might a target be established?
 - This indicator was introduced in the 2009 Handbook. How useful has it been?
 - We know that diagnosing an intrapartum stillbirth is more accurate if the fetal heartbeat (FHB) was measured and documented during labor or on admission but often FHB is not documented. The Handbook recommends that this indicator be restricted to newborns with known birthweight > 2500 grams because low birthweight babies are at greater risk of early death. Again, birth weight is not always available in the registers, especially for the intrapartum stillbirths. Given these issues, should this indicator be changed? Should it be dropped? Or should more effort be placed on improving data quality?
 - What are your thoughts on how intrapartum stillbirths are currently captured routinely in registers / HMIS? How does that affect this indicator?
 - Should additional indicator(s) be introduced for the newborn? If yes, what? If not, please explain.

Proportion of maternal deaths due to indirect causes in EmOC facilities

- Have you used this indicator? Yes/No (if no, skip to the next section)
- How have you used the proportion of maternal deaths due to indirect causes in EmOC facilities indicator:

Please explain how it has been useful to you.

- Have you had any problems using this indicator?
Please explain your responses:

Guidance for indicators

- What has your experience been using the 2009 Handbook?
- Have you used the special studies suggested in the Handbook? If yes, which ones?
- What format for the Handbook and guidance – electronic, interactive, other novel approaches etc – would be most useful for you and others in the system?
- How can we support countries to disseminate the new updated guidance? What are some different ways that we could disseminate the new EmONC framework and indicator set, along with their guidance, to users?

Questions about potential changes

[Present new EmONC signal functions]

- What are your thoughts on these proposed levels of care and EmONC signal functions? [probe: is there anything missing? Are you surprised by anything? Do you think anything should be changed? Do you think anything should be moved to a different level? Do you see any issues in implementing this revised EmONC framework?]
- As part of the Re-visioning process, we will include a set of “emergency” signal functions for the newborn. For the new set of newborn signal functions would it make sense to keep them as a parallel set and report them separately or should maternal and newborn SFs be considered just one set and interpreted together?

Appendix VI- Journey map template

	Identifying Complication			Treating Complication			Recovery Or Referral	
Sub-Stages								
Confidence Level								
Working well?								
Challenges?								

Appendix: VII Systems map sample image

Illustrations



Photos



Example List for images to include:

Places

- Administrative offices, e.g. district & regional government, national units
- Hospitals
- Health Centres
- BEmONC and CEmONC sites
- Community homes
- Offices & other buildings
- Intake / Reception
- Operating Theatre
- Delivery Ward

People

- Policy makers
- Managers
- Different types of health worker
- M&E Officers, Data clerks
- Women and families

Things

- Roads
- Roadsigns / traffic lights
- Traffic
- Parking
- Ambulances, taxis, and other vehicles
- Computer
- Mobile phone
- Money

Actions

- Walking
- Driving
- Entering Labour
- Paying

Appendix VIII: Sliders template

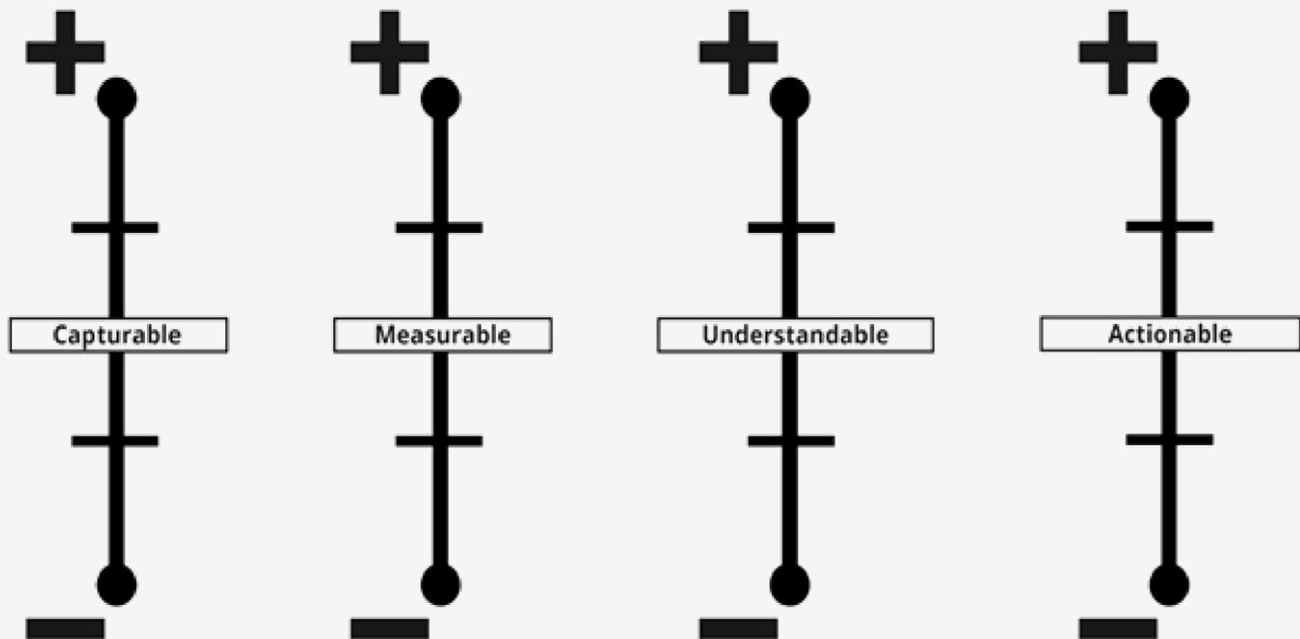
Instructions:

Discuss what each word on the sliders means to you.

Review the indicators shared with you.

Place each of the indicators on each slider based on where you think it fits.

Discuss together why you have placed the indicators in those locations.



Appendix IX: Storyboard template

Instructions:

Tell the story of the indicator from when the raw data is captured to when and how it is used, including the steps of processing along the way. Draw what is happening in the boxes and describe in the lines below each box.















The Re-visioning EmONC Malawi Team