Re-visioning EmONC process and evidence base for revised EmONC Framework

The Re-visioning Emergency Obstetric and Newborn Care (EmONC) project followed a systematic process to review, rethink and revise the EmONC Framework. The project was first organized into four workstreams, each led by two co-chairs. For workstreams 1-3, one co-chair represented a sponsoring agency and the other was from outside the organizations, representing a range of geographic areas and disciplines. Workstream 4 was co-led by two sponsoring agencies, AMDD and UNFPA. Each workstream appointed 8-10 members, again seeking geographic and disciplinary diversity, as well as expertise in both maternal and newborn health. It was also important that each workstream include members with experience using the EmONC Framework and based primarily in the field.

The project's Steering Committee included representatives of the sponsoring agencies – WHO, UNICEF, UNFPA, AMDD, London School of Hygiene and Tropical Medicine – and the workstream co-chairs (listed below). A full list of Steering Committee and workstream members can be found in Table 1 at the end of this section.

- Workstream 1: Signal Functions, co-chaired by Sarah Moxon (LSHTM) and Sudha Sharma (Nepal, ex-MOH, ex-UNICEF)
- Workstream 2: Levels of Care, co-chaired by Allisyn Moran (WHO) and Jalemba Aluvaala (U of Nairobi, Kenya)
- Workstream 3: Quality of Care, co-chaired by Jennifer Requejo (then UNICEF) and Patience Afulani (UCSF)
- Workstream 4: Lessons from EmONC Framework, chaired by Lynn Freedman (AMDD) and Michel Brun/Jean-Pierre Monet (UNFPA)

All workstreams developed a workplan that included reviews, as well as expert and user consultations, leading to recommendations to the Steering Committee for the revised Framework.

The project also convened a newborn expert group, chaired by UNICEF and WHO, to help finalize newborn aspects of the revised Framework and ensure alignment with newborn guidance, existing and forthcoming. The group met periodically throughout the project.

On issues related to referral, the project supported and worked closely with the Transport and Referral Community of Practice and its management committee, chaired by Loveday Penn-Kekana at LSHTM and including technical experts from FHI360 with extensive experience using the EmONC indicators, as well as an emergency medicine expert from Stanford University School of Medicine. The community of practice held regular webinars open to the field and also consulted closely with the emergency and critical care team at WHO.

Using human-centered design methodology, the project conducted three country studies, working with local research organizations: CEFOREP in Senegal; Kamuzu University of Health Sciences in Malawi; and icddr,b in Bangladesh. Scope provided expertise on human-centered design.

A list of all the individuals who participated in the various advisory groups and activities described in this section can be found at the end in Table 1. All working documents, reports, and key tools related to the Re-visioning project and the EmONC Framework are collected on a website <mark>[link]</mark> and available publicly.

REVIEW

Workstream 1: Signal Functions

Mapping: Workstream 1 started by mapping the primary complications leading to maternal and newborn deaths and the primary interventions used to prevent, identify and manage them, in accordance with current WHO guidelines. This provided a preliminary list of candidate signal functions, which was narrowed down during the in-person convening described below.

Narrative review: Several members of Workstream 1 led a meta-narrative inspired review to understand how the concept of signal functions had been adapted and used in maternal and newborn health, sexual and reproductive health and rights, emergency medicine and beyond since signal functions were first introduced in 1997. The review identified 3 narrative traditions in the literature: clinical, health systems, human rights. A key finding was that the clinical narrative, which focused on signal functions from a clinical perspective using signal functions as a guide to clinical care to be delivered in a facility, was often in tension with the health systems narrative, which focused on signal functions from a perspective of overall planning and monitoring of facility functioning. While the clinical narrative seeks greater granularity and precision in measurement and steered toward clinical quality indicators, the health system narrative valued parsimony and simplicity.(1)

In-person convening: In May 2022, an in-person convening of Steering Committee and several other workstream members was conducted to review evidence, clarify the signal function definition and the role of signal functions in the Framework, and to prepare a Delphi study (including a prioritized list of candidate signal functions).

Workstream 2: Levels of Care

Systematic literature review on levels of care: Workstream 2 conducted a systematic review of the literature to understand how many levels of maternal and newborn health care are most often used in countries and what criteria are used to differentiate those levels, so that the revised EmONC Framework could be organized accordingly.(2) The results of this scoping review showed that the most commonly described country operationalization was three levels of care (with the lowest SBR, NMR, and MMR settings using mostly three or four levels of facility care), and that facility characteristics, human resource characteristics, and clinical patient characteristics are most commonly used to differentiate between hierarchical levels of MNH care.

By-passing literature review: A workstream consultant conducted a rapid review of the literature on by-passing (when users choose to by-pass the nearest facility to seek care elsewhere). The authors proposed ways to measure by-passing in the system (3), which is proposed as a supplemental study in the chapter on Indicator 7, Institutional delivery rate.

Secondary analysis of WHO case studies and Delphi results on levels of care: As part of a separate initiative to inform global MNH strategies, WHO had undertaken six country case studies focusing on successful MNH strategies.(4) Workstream 2 conducted secondary analysis of the data from these case studies to identify potential differences in the provision of MNH care in countries at later stages of obstetric transition compared to those at earlier stages. They also analyzed survey data collected during round one of the Delphi survey on the number of levels of care respondents used to describe the health system they were most familiar with. The goal was to understand what criteria of care respondents listed for women and newborns to designate the highest and lowest levels of care in that health system. Their results supported the use of three levels of MNH care for the revised EmONC Framework, and found that obstetric levels of care were most commonly defined by what evidence-based practices/procedures were provided, whereas newborn levels of care were most commonly defined by what essential physical resources were present.(5)

Assess overlap with WHO's Harmonized Health Facility Assessment tool: Workstream 2 mapped out the harmonized health facility assessment tool to highlight its overlaps with the evolving EmONC Framework. The purpose was to promote alignment.

Workstream 3: Quality of Care

Scoping review of quality of care indicators and frameworks: This scoping review was undertaken to identify candidate quality of care indicators for the EmONC Framework and to identify gaps.(6) An important principle in the Re-visioning project is to align where possible with other global initiatives, in order to avoid small variations that can confuse and also add burden to countries' data collection efforts.

Secondary analysis of data used to develop Person-Centered Maternity Care (PCMC) scale: This secondary analysis of data from Kenya, India and Ghana sought to determine whether patients with obstetric complications consistently reported any different experience than other obstetric patients. The analysis found insufficient evidence to suggest difference. Consequently, the PCMC scale as validated for use in maternity services generally, has been recommended for use in the revised EmONC Framework.(7)

Rapid review of patient safety and provider experience indicators: Although there is a significant literature linking providers' own experience/wellbeing with the quality of the care that they deliver, especially respectful care, this review identified measurement of provider experience of care as a gap in the literature. There are no specific scales to measure provider experience.(8)

Workstream 4: Experience Using EmONC Framework

Indicator briefs, including literature reviews: For each indicator in the existing set, the workstream wrote a brief that included an analysis of literature using the indicator and critiquing the indicator. Briefs also included lessons learned from use of the indicator, drawn from experience of workstream members and from a convening of the AMDD Africa-based technical team that provided technical support to countries that conducted dozens of EmONC assessments in the prior 15 years.(9) Findings from these activities informed proposed revisions to the existing EmONC indicators.

Umbrella review of complication prevalence: This review was done to assess the literature on complication prevalence, to determine whether the estimated 15% of all pregnancies used in the existing

framework is still justified. Although there are studies showing much higher rates of complications,(10) the definitions and methodologies used in the studies are so inconsistent that there is no strong evidence base for changing this estimate in the revised Framework. (==*Estimating need for emergency obstetric care* in the tools and resources section of the Digital EmONC Guide== provides a rationale for the decision to maintain the 15% estimate.)

Country studies: Using human-centered design methods, country studies were conducted by country-based partners in Senegal, Malawi and Bangladesh, three countries that have made extensive use of the EmONC Framework over the last 20 years.(11),(12),(13) The studies focused on experience using the EmONC Framework itself (not on their maternal newborn strategies overall) to generate insights for the revision, and ultimately focused on key problems in providing EmONC services that were not addressed by the current indicators.

There were 41 participatory workshops conducted in the three countries with over 275 participants. Workshop participants included: national managers, planners and policymakers, sub-national managers, expert clinicians, HMIS experts, UN managers, health providers (doctors, specialists, nurse-midwives), providers and managers from the private health sector, ambulance drivers, and community representatives. In addition, 48 people were interviewed including ministry of health officials at the national and sub-national levels, expert clinicians and researchers. A range of HCD generative methods were used in these sessions (e.g., collage, card sorting, sliders, storyboard, journey maps).

Secondary analysis of data from national EmONC assessments: The AMDD team had access to multiple data sets from national EmONC assessments (some of which have not been released publicly by the countries who own the data sets but who gave AMDD permission to use them for this process).(14) Secondary analyses were done to answer multiple questions important for the revision of the EmONC Framework. Analyses are limited to the information collected for past monitoring efforts so, for example, new signal functions are not included. Insights from county studies helped interpret results from this secondary data analysis. Some key findings included:

> ***Planning without prioritization***
> Repeatedly we see countries being overly ambitious and planning without prioritization (e.g., designating all hospitals as Comprehensive EmONC and all health centers as Basic EmONC). Because resources and attention are spread thin, many facilities are unable to do all signal functions for their level. Most often, it is Basic EmONC facilities that are not performing all the signal functions that are recommended for that level of care. (Figure 1) But many of those facilities qualify as Basic -1, or Basic -2 or Comprehensive -1 or -2. If the missing signal functions were added, countries come close to meeting the original availability indicator benchmark (i.e., 5 EmONC facilities per 500,000 population). (Figure 2) **Recommendation**: It is helpful to show the Basic -1 or -2, and Comprehensive -1 or -2 results, to provide a more complete picture of the EmONC system available and to help prioritize where to efficiently invest.

Figure 1. Comparing potential, recommended, and performing EmONC facilities, by level, in Ethiopia 2016 and Malawi 2020
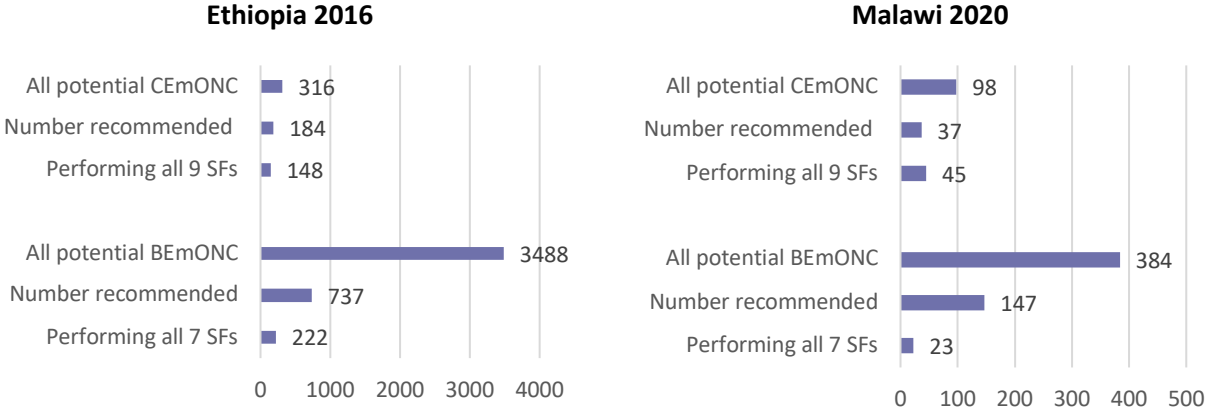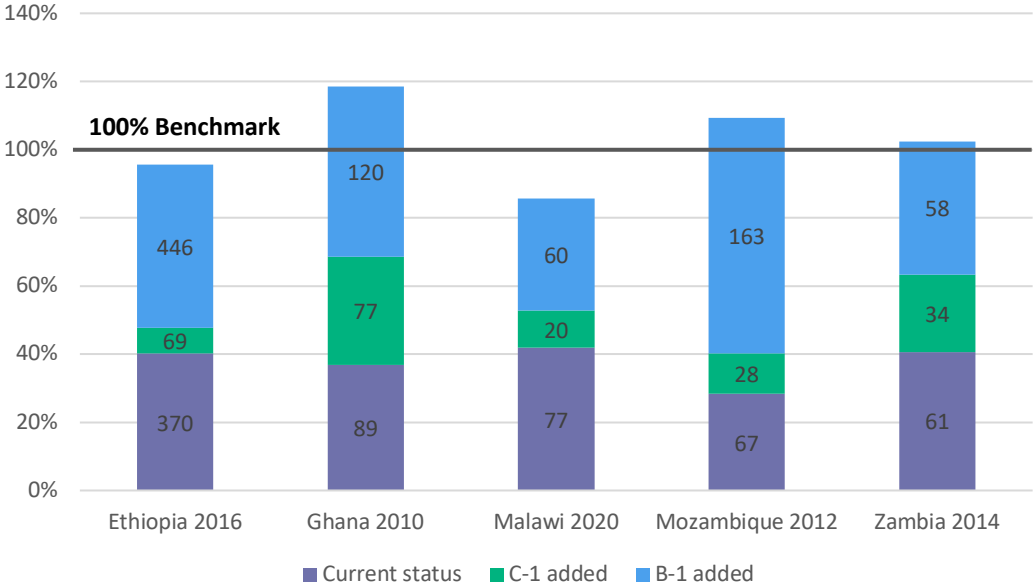
Ethiopia 2016

All potential CEmONC	316
Number recommended	184
Performing all 9 SFs	148
All potential BEmONC	3488
Number recommended	737
Performing all 7 SFs	222

0 1000 2000 3000 4000

Malawi 2020

All potential CEmONC	98
Number recommended	37
Performing all 9 SFs	45
All potential BEmONC	384
Number recommended	147
Performing all 7 SFs	23

0 100 200 300 400 500

Figure 2. Implications for achieving the benchmark if we include B-1 and C-1, in select countries

100% Benchmark

	Ethiopia 2016	Ghana 2010	Malawi 2020	Mozambique 2012	Zambia 2014
B-1 added	446	120	60	163	58
C-1 added	69	77	20	28	34
Current status	370	89	77	67	61

■ Current status ■ C-1 added ■ B-1 added

Note: numbers in bars reflect number of health facilities.

Missing Signal Functions

The three EmONC signal functions that were most consistently performed across countries and types of health facilities were uterotonics, antibiotics and neonatal resuscitation. (Figure 3) The four EmONC signal functions that were least frequently performed across countries were removal of retained products, manual removal of placenta, assisted vaginal delivery and parenteral anticonvulsants. (Figure 4) Across the board, hospitals do better than non-hospitals at performing all signal functions. (Figure 3 and Figure 4) But in most countries, more women go to health centers than hospitals to deliver. (Figure 5) **Recommendation**: Even if a country's long-term goal may be for all women to deliver in hospitals providing Comprehensive EmONC or Intensive EmONC, many countries are far from reaching that goal. The revised Framework needs to be forward-looking while still providing shorter-term strategies for countries with large

proportions of women delivering in lower level facilities that are not hospitals. These strategies should feature efforts to ensure that health centers that meet certain criteria (see <mark>How to use the EmONC Framework</mark>) are able to perform Basic EmONC.

Figure 3. EmONC signal functions most commonly performed, select countries, by type of facility

Uterotonics

	Cambodia 2020		Ethiopia 2016		Ghana 2010		Malawi 2020		Mozambique 2012		Zambia 2014	
	Hospital	HC	Hospital	HC	Hospital	HC	Hospital	HC	Hospital	HC	Hospital	HC
Value	100	99	95	93	100	97	100	98	100	95	100	96

Neonatal Resuscitation

	Cambodia 2020		Ethiopia 2016		Ghana 2010		Malawi 2020		Mozambique 2012		Zambia 2014	
	Hospital	HC	Hospital	HC	Hospital	HC	Hospital	HC	Hospital	HC	Hospital	HC
Value	100	65	90	71	85	55	99	88	100	68	95	54

Antibiotics

	Cambodia 2020		Ethiopia 2016		Ghana 2010		Malawi 2020		Mozambique 2012		Zambia 2014	
	Hospital	HC	Hospital	HC	Hospital	HC	Hospital	HC	Hospital	HC	Hospital	HC
Value	100	75	96	79	97	72	100	87	100	57	98	78

6

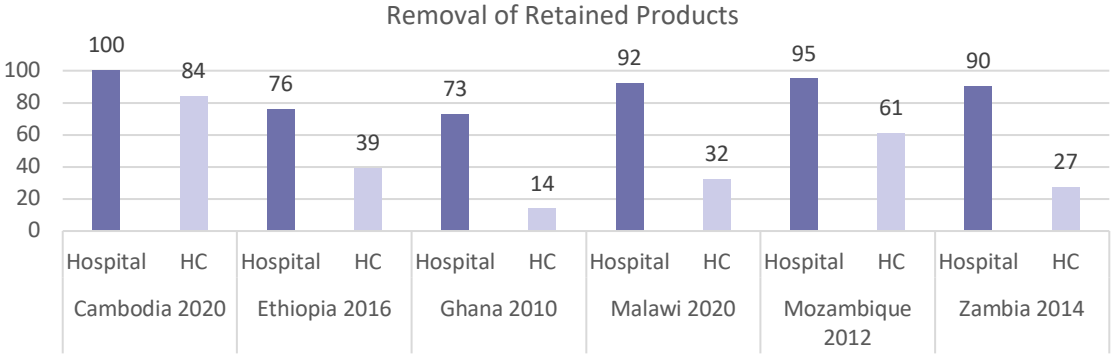## Figure 4. EmONC signal functions least performed, select countries, by type of facility

Removal of Retained Products

	Cambodia 2020		Ethiopia 2016		Ghana 2010		Malawi 2020		Mozambique 2012		Zambia 2014	
	Hospital	HC	Hospital	HC	Hospital	HC	Hospital	HC	Hospital	HC	Hospital	HC
	100	84	76	39	73	14	92	32	95	61	90	27

Manual Removal of Placenta

	Cambodia 2020		Ethiopia 2016		Ghana 2010		Malawi 2020		Mozambique 2012		Zambia 2014	
	Hospital	HC	Hospital	HC	Hospital	HC	Hospital	HC	Hospital	HC	Hospital	HC
	100	69	81	60	72	37	76	32	95	54	79	39

Anticonvulsants

	Cambodia 2020		Ethiopia 2016		Ghana 2010		Malawi 2020		Mozambique 2012		Zambia 2014	
	Hospital	HC	Hospital	HC	Hospital	HC	Hospital	HC	Hospital	HC	Hospital	HC
	100	41	80	22	80	48	89	53	95	46	87	46

Assisted Vaginal Delivery

	Cambodia 2020		Ethiopia 2016		Ghana 2010		Malawi 2020		Mozambique 2012		Zambia 2014	
	Hospital	HC	Hospital	HC	Hospital	HC	Hospital	HC	Hospital	HC	Hospital	HC
	100	56	85	30	41	4	79	18	75	11	66	2

Figure 5. Contribution of hospitals vs. non-hospitals to the institutional delivery rate, in select countries
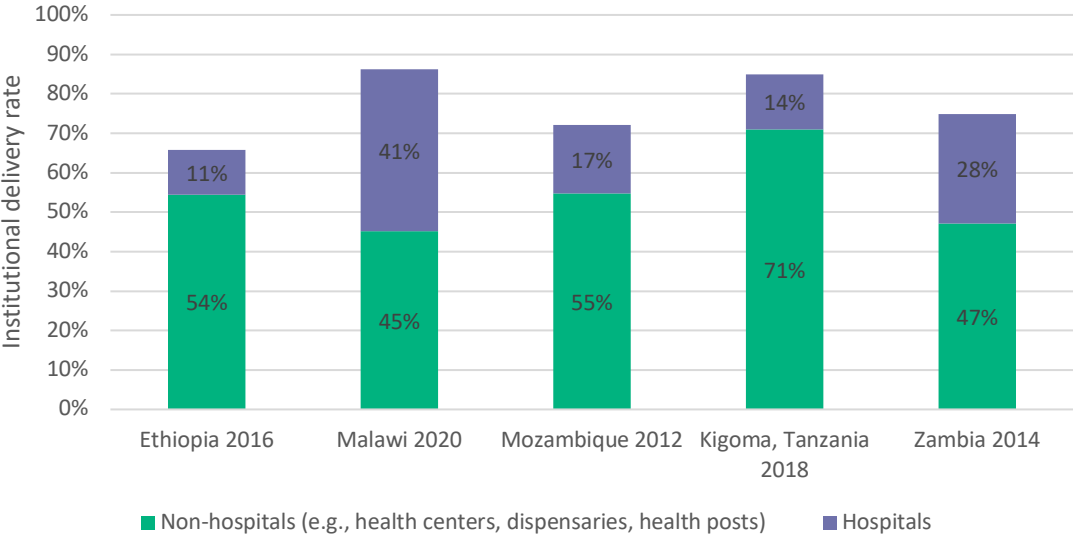
Caseload matters

Many facilities attend fewer than 600 deliveries a year (50 deliveries per month), and in some countries a substantial proportion of births occur in these smaller facilities. (Figure 6)

Figure 6. Distribution of facilities by caseload and distribution of institutional deliveries by caseload, select countries

Distribution of institutional deliveries, by caseload
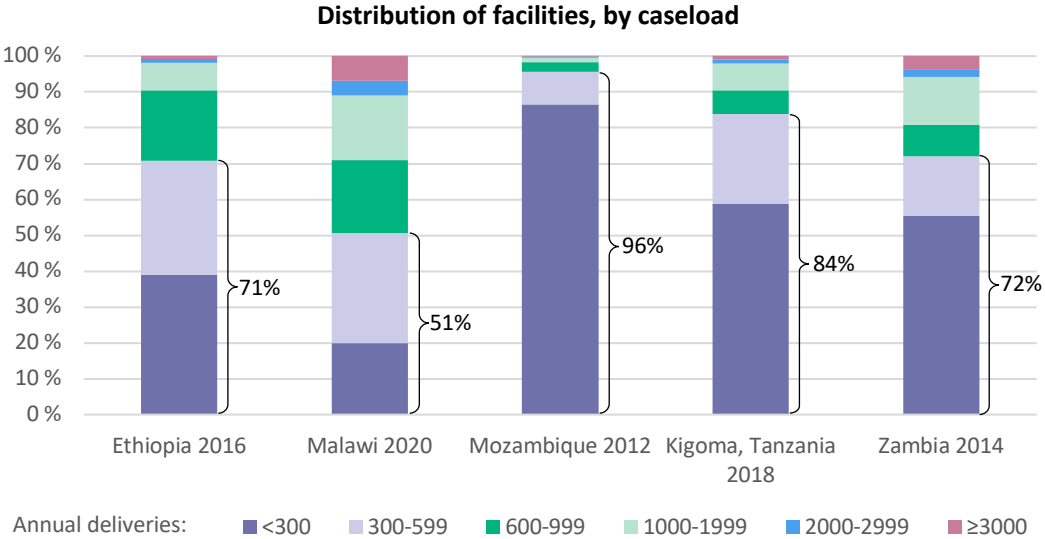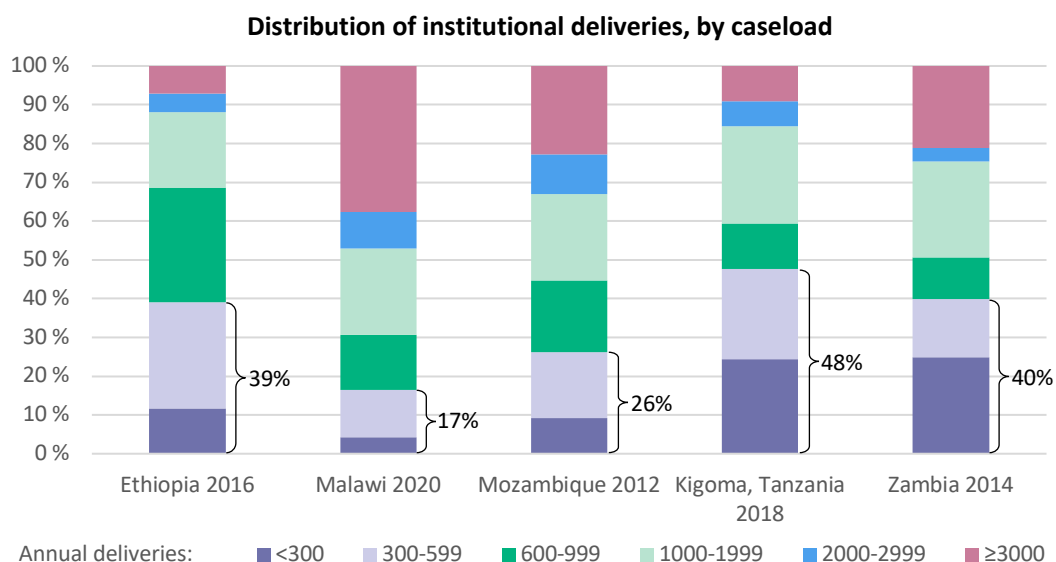
Caseload is an important factor to consider when planning EmONC systems because it is a determining factor in whether a facility is able to perform all signal functions in a 3-month period. Regular performance of signal functions is important for maintaining skills and efficient use of scarce resources such as equipment and supplies. Analysis across all the secondary data showed that non-hospitals performing all 6 of the 2009 EmONC Framework Basic EmONC maternal signal functions[1] had a median of 53 deliveries per month, which would translate to approximately 600 deliveries per year. (Figures 7 and 8) **Recommendations**: Caseload should be a criterion when prioritizing which lower-level facilities should be Basic EmONC facilities. If a country wants to work towards the long-term goal of having all women give birth in EmONC facilities, then planning must factor in the expectation that all women will eventually deliver in facilities with at least 600 deliveries per year. Facility caseload is one assumption that is used in generating estimates using the Long-term Calculator explained in ==Indicator 1a, Progress toward long-term goal for EmONC availability.==

Figure 7. Median monthly caseload at non-hospitals, by number of maternal signal functions[1] performed, select countries (15),(16),(17),(18),(19),(20),(21),(22)

Maternal Signal Functions	Cambodia 2020 N=66	Ethiopia 2016 N=3,446	Ghana 2010 N=870	Malawi 2020 N=384	Mozam-bique 2012 N=869	Zambia 2014 N=262	Kigoma, Tanzania 2018 N=191
0	0 (n=0)	11 (n=37)	5 (n=14)	0 (n=0)	32 (n=13)	3 (n=8)	0 (n=0)
1	17 (n=2)	22 (n=292)	7 (n=117)	33 (n=24)	17 (n=100)	7 (n=27)	0 (n=0)
2	19 (n=10)	26 (n=720)	10 (n=237)	29 (n=104)	21 (n=160)	12 (n=61)	20 (n=4)

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[1] In the 2009 EmONC Framework, the 6 Basic EmONC maternal signal functions were: parenteral antibiotics, uterotonic drugs, parenteral anticonvulsants, manually remove placenta, remove retained products, and perform assisted vaginal birth.

3	22 (n=28)	31 (n=971)	9 (n=286)	43 (n=105)	30 (n=193)	17 (n=78)	16 (n=88)
4	24 (n=18)	35 (n=799)	14 (n=162)	50 (n=89)	39 (n=209)	18 (n=58)	24 (n=81)
5	27 (n=7)	42 (n=434)	19 (n=47)	70 (n=38)	48 (n=161)	20 (n=28)	71 (n=12)
6 [fully functioning]	**32 (n=1)**	**45 (n=193)**	**25 (n=6)**	**88 (n=24)**	**68 (n=33)**	**26 (n=2)**	**85 (n=6)**

Figure 8. Median monthly caseload at non-hospitals, by number of maternal signal functions performed, select countries

Median caseload, by maternal signal function performance
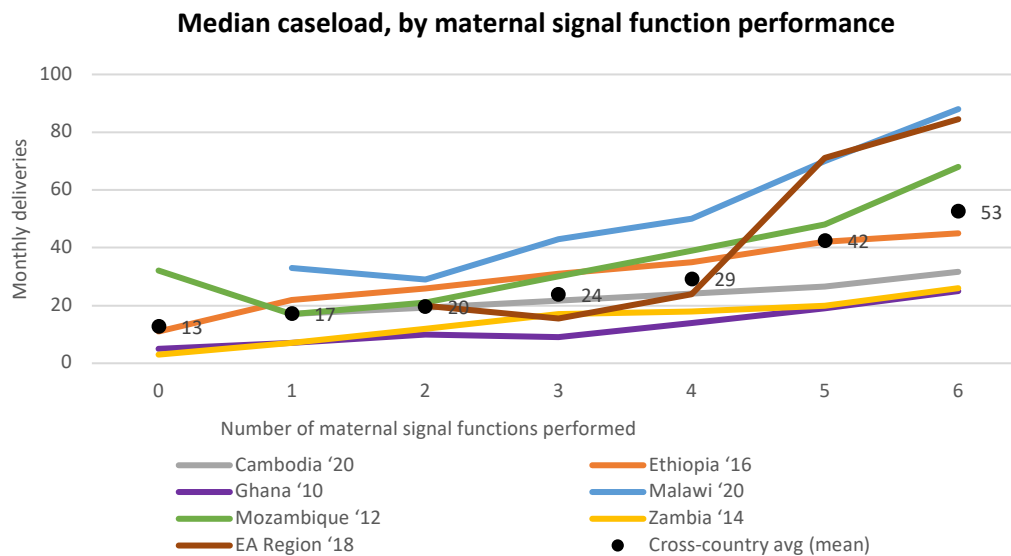
Readiness

Many facilities perform EmONC signal functions but do not have optimal conditions to do so (for example adequate human resources, drugs, equipment). In the charts below (Figures 9-12), the data show the following from left to right: (1) the first bar shows the number of facilities recommended for the population based on the 2009 EmONC benchmark of 5 EmONC facilities per 500,000 population; (2) the second bar shows the number of facilities performing all of the 2009 EmONC signal functions (Basic and Comprehensive); (3) the third bar shows the number of facilities performing all of the EmONC signal functions that are open 24/7; (4) the fourth bar shows the number of facilities performing all of the EmONC signal functions that are open 24/7 and meet the human resources benchmark based on UNFPA's implementation guidance[2]; (5) the fifth bar shows the number of facilities performing all of the EmONC signal functions that are open 24/7 and meet the human resources benchmark based on FIGO's guidance(23); and (6) the sixth bar shows the number of facilities performing all of the EmONC signal functions that are

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[2] Human resources benchmark for Comprehensive EmONC facilities = at least 3 midwives + at least 1 person with surgical skills + at least 1 person with anesthesia skills per 24-hour period. For Basic EmONC = at least 3 midwives per 24-hour period.

open 24/7 and have tracer commodities (as defined by UNFPA in their implementation guidance[3]). **Recommendation**: Add readiness indicators to the EmONC Framework.

Figure 9. Elements of readiness and performance of EmONC signal functions, Ethiopia 2016
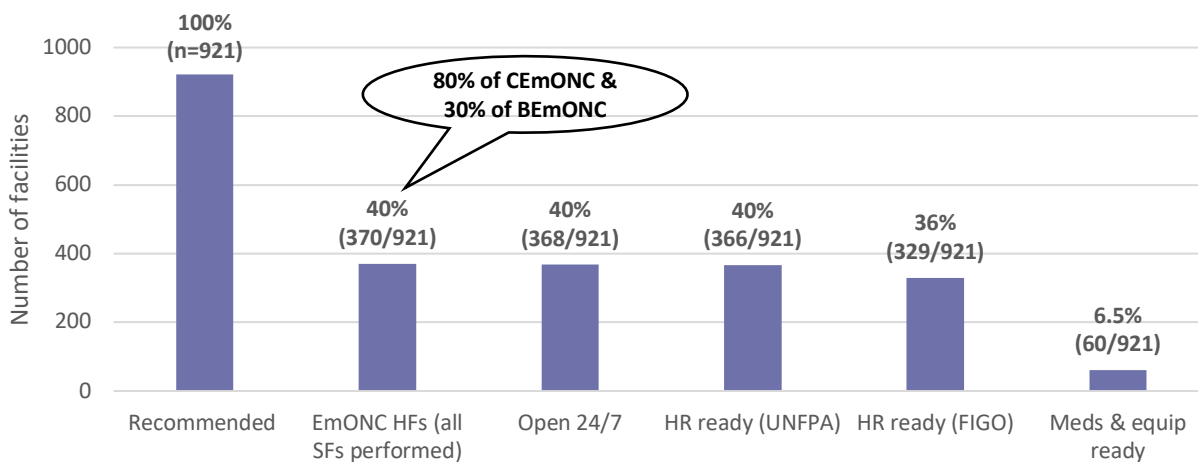
Figure 10. Elements of readiness and performance of EmONC signal functions, Malawi 2020

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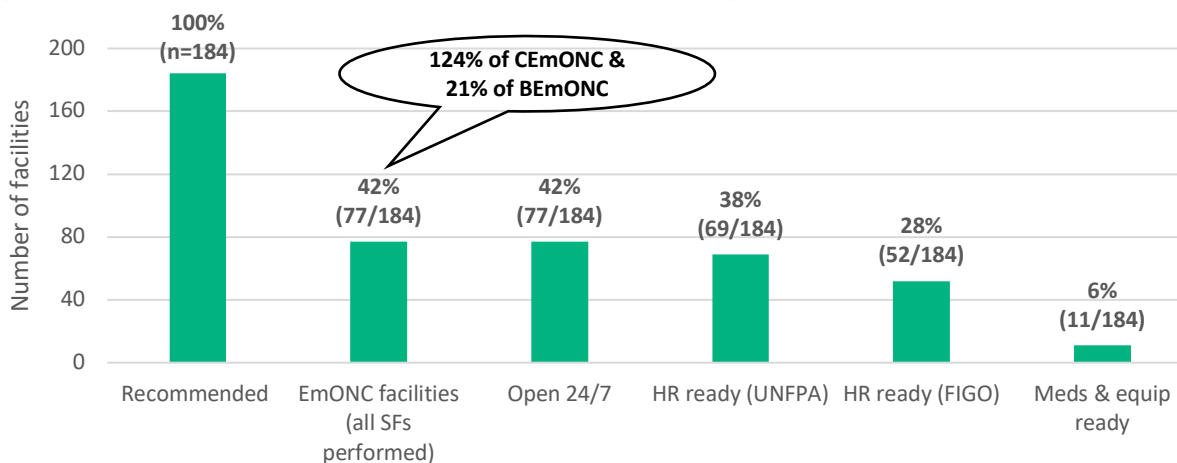
[3] Commodities included: no stock-outs in the last 3 months of oxytocin, magnesium sulfate, gentamicin (inj), ampicillin or benzyl penicillin (inj), metronidazole (inj), misoprostol, and units of blood; and, vacuum extractor with cups, neonatal ambu bag with masks, sizes 0 and 1 and a complete MVA kit.

Figure 11. Elements of readiness and performance of EmONC signal functions, Mozambique 2012

100%
(n=236)

68% of CEmONC &
19% of BEmONC

29%
(67/236)

29%
(67/236)

23%
(54/236)

14%
(34/236)

2%
(5/236)

Number of facilities

Recommended | EmONC HFs (all SFs performed) | Open 24/7 | HR ready (UNFPA) | HR ready (FIGO) | Meds & equip ready
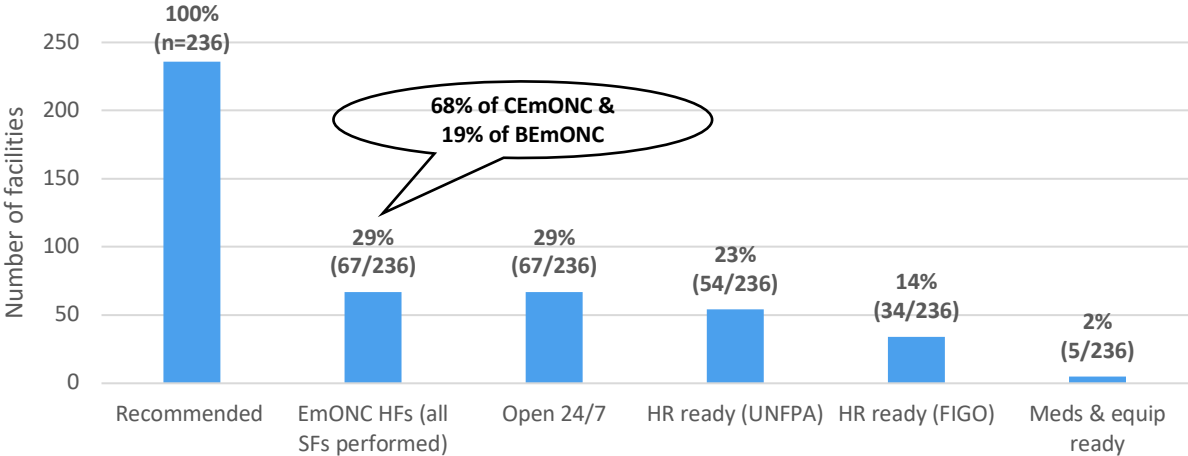
Figure 12. Elements of readiness and performance of EmONC signal functions, Zambia 2014

100%
(n=150)

190% of CEmONC &
3% of BEmONC

41%
(61/150)

41%
(61/150)

29%
(44/150)

25%
(37/150)

3%
(5/150)

Number of facilities

Recommended | EmONC HFs (all SFs performed) | Open 24/7 | HR ready (UNFPA) | HR ready (FIGO) | Meds & equip ready
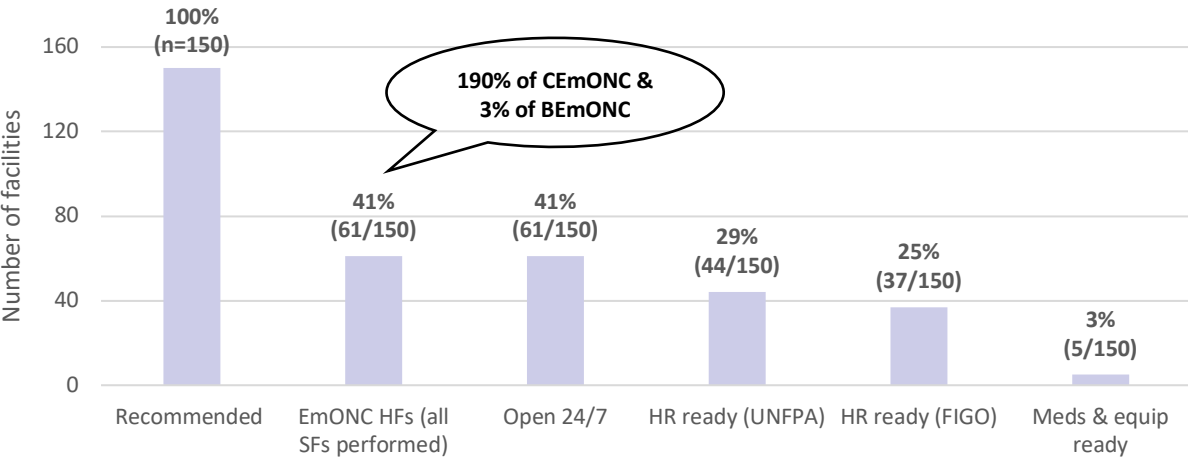
UNFPA analyzed EmONC monitoring data from 14 high-burden countries and found a significant correlation between "fully functioning" EmONC facilities (defined by UNFPA as EmONC signal function performance and readiness elements) and a reduction in MMR. (Figure 13) There was no correlation between facilities performing the EmONC signal functions, but without readiness elements, and the maternal mortality ratio.(24)

Figure 13. Correlation between maternal mortality ratio and availability of "fully functioning" EmONC (after adjusting for readiness and cross-checking for complications), select countries (25)

- Using EmONC monitoring data for 14 high burden countries, UNFPA found:
  - A significant correlation between MMR and number of "fully functioning" EmONC facilities (when performance + readiness + case management elements taken into account): p-value = 0.013 using population and 0.022 using births
  - No correlation between MMR and the number of EmONC facilities defined by performance alone, for either population-based estimates or births-based estimates: p- value = 0.13 and 0.12, respectively
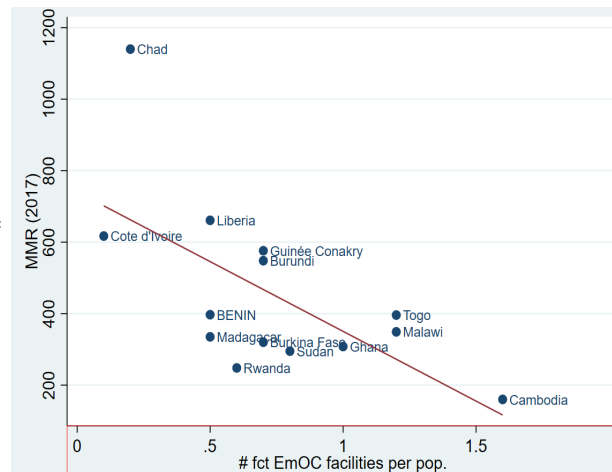
Referral

Through a consultative process, the Transport and Referral Community of Practice identified six dimensions of referral care that should be measured to provide a comprehensive understanding of referral system functionality. Existing data from EmONC assessments from Ghana, Zambia, Cambodia, Ethiopia and Malawi (from 2010-2020 comprising over 6,000 health facilities) were mapped onto the six dimensions. Descriptive analyses were conducted and gaps in available data were identified. This work formed the basis for Indicator 5, Emergency referral readiness.

RETHINK

Delphi study on signal functions and levels of care: Workstreams 1 and 2 collaborated to conduct a Delphi study on proposed new signal functions (including newborn signal functions) and levels of care.(26) It produced a preliminary list of prioritized signal functions by level of care, which was then refined based on expert consultation. The Delphi also tested out a proposed name change for the "Basic" level of EmONC because of reports that some misunderstand this level of care as being intended for low-risk women. The proposed new name of "First-level EmONC" was not unequivocally embraced by Delphi respondents; some felt strongly that Basic EmONC was well established in countries' planning processes and a name change would cause confusion. The recommendation is for the Guide to be more explicit in defining Basic EmONC.

Prioritization of quality of care indicators: After collecting candidate indicators in the scoping study, Workstream 3 conducted a prioritization process with workstream members, ultimately focused on indicators related to signal functions, and were conscious to align where possible with WHO's current quality of care measurement work.(27)

In-person workshop examining findings and generating ideas for the revision: A 3-day workshop, including the Steering Committee and others from multiple agencies and experts was held in Tarrytown,

New York in September 2022 to examine the findings from the review phase and to generate ideas for the revised Framework. Recommendations from this workshop included the following:

- When measuring availability, it is best to start by looking only at performance of signal functions, and then to add other criteria (e.g., human resources and commodities).
- When classifying facilities by EmONC status, obstetric and neonatal signal functions should be considered as an integrated set (with recommended sub-analyses looking at obstetric and neonatal signal functions separately), and all signal functions must be performed (i.e., all or nothing) in order to be classified as an EmONC facility.
- Measuring availability needs to be more context-specific, taking into account "maturity analysis"/obstetric transition.
- Using births (as opposed to population) for measuring availability makes sense (especially given variation in fertility rates across countries) and is more forward-looking.
- EPMM Target 4 should serve as the new measure of geographic distribution. In addition to measuring 2-hour access, countries should also measure 1-hour and 30-min access.
- Geospatial analysis (ultimately Indicator 6, Home to Comprehensive EmONC within 1hr) provides critical information about geographic distribution, but does not address need/medical rationale and does not factor in the capacity/size of facilities. Measuring availability (now Indicators 1a and 1b) is therefore a necessary complement.
- The Framework should include an indicator (or series of indicators) to measure functionality of the referral system (including both facility-level and system-level referral mechanisms), as well as a signal function measuring provision of care during patient transfer.
- Human resources should be measured to capture the actual presence of competent staff per shift.
- Health workforce wellbeing is important to capture, and two separate concepts should be pursued: (1) Teamwork – to understand the collective environment; and (2) Individual well-being – to capture individuals' experiences.
- The PCMC scale should be used to measure experience of care. Newborn-focused experience of care questions should be added.
- There is clear value in a 'met need' indicator for women experiencing complications as well as small and sick newborns. It was recommended that the numerator be improved by matching women/SSNB who have complications to whether they received treatment, and that if possible, the denominator should not be an estimated number. It was also recommended that alternative constructions more akin to standard coverage measures be considered (i.e., [no. of women/babies with complications who received treatment] / [no. of women/babies who had complications]).
- Overmedicalization indicators could include the following: various analyses of cesarean section rates, overuse of labor augmentation, inappropriate use of antibiotics for newborns, overuse of incubators/radiant warmers (Mother-baby separation), or premature discharge of newborns.
- The Framework should include an indicator focused on togetherness, either 'together mother-baby care days delivered in a month' or a cruder measure with opportunity for future elaboration.

Country studies in Senegal, Malawi, and Bangladesh (see above under 'review') used human-centered design methods to explore key problems in providing EmONC services. The following seven insights were generated based on what mattered most to participants when considering the delivery of good-quality EmONC:

1. Women and newborns' lives are in danger due to health system failures caused by inadequate resources, and insufficient planning and management.
2. Women and families struggle in emergencies to mobilize money and resources needed for medicines, blood transfusion and referral transport.
3. Health providers must find quick, often imperfect, solutions in chaotic under-resourced health facility environments, sometimes compromising quality of care.
4. Providers are afraid and lack confidence to perform certain EmONC signal functions due to poor support systems.
5. Providers' wellbeing is compromised due to poor support from the system and strained relationships with communities.
6. Continuous care for women and newborns is disrupted due to poor system readiness, which poses mental and physical danger to women, babies, providers and drivers.
7. Systems fail newborns due to lack of focus on the dyad and limited integration of maternal and newborn services.

Out of these insights, constructs were identified for new indicators to include in the revised Framework(28),(29),(30). Below we summarize the key results from the country studies related to each of these identified constructs:

- Human resources are insufficient in number, particularly during certain shifts of the day, and are often working under conditions that make delivery of good quality care difficult or impossible.
- Among the key deficiencies in facility functionality are equipment, drugs, and supplies, with frustration expressed about stock-outs, poor maintenance of equipment and long periods of malfunction.
- The inability to manage women and newborns with complications at the lower level because of poor conditions and understaffing, means even more reliance on the referral system to get patients to definitive care. Yet the referral systems are often themselves inefficient and poorly functioning.
- These problems seriously affect the morale of workers, frustrated by their inability to provide required care.
- Some participants, especially in Bangladesh, reflected on bigger structural problems in a system that relies heavily on private sector providers, resulting in extremely high cesarean section rates and changing norms concerning cesarean section. Good care becomes increasingly out of reach for the poor. Lack of accountability and poor information systems (that don't include the private sector) exacerbate the problem.

International Maternal Newborn Health Conference, Cape Town, May 2023: The project used the IMNHC conference to introduce ideas for the re-visioning to the broader MNH community and to collect feedback and input. In addition to a panel on the findings from the review phase (the workstreams and country projects), we conducted a thematic session with break-out groups on proposed new indicators as well as feedback on the overall EmONC Framework more generally. Feedback from the conference was largely in support of expanding the Framework to explicitly address common health systems challenges. Support was especially strong for including new indicators for health workforce adequacy and wellbeing.

REVISE

The review and rethink stages highlighted several key gaps in the existing Framework. In the "revise" phase, the project undertook systematic processes to develop indicators to fill these gaps. Many of the new indicators in the set underwent "groundtruthing" in Senegal and Malawi. Groundtruthing for the Re-visioning EmONC process aimed to understand, explore, and communicate what it feels like for primary users to engage with drafts of the revised Framework and indicators. This provided the opportunity to check assumptions with end users, quickly get key feedback, and to improve and iterate on these drafts. Feedback that was sought included feasibility, desirability, and viability of the draft revisions from the perspective of users. In November 2023, six indicators[4] were pilot tested in five health facilities in Senegal (one national teaching hospital, one regional hospital, two health centers and one health post). The pilot assessed the indicators' feasibility (i.e., data availability, amount of time spent collecting data, ease of calculation), and their utility in monitoring EmONC (i.e., feedback from health providers in pilot facilities). Key results from groundtruthing activities in Senegal and Malawi are described in the relevant sections below.

The key areas for which new indicators have been identified or developed are the following:

Availability measurement: Workstream 4 reviewed EmONC assessment data from many countries and reflected on broad experience of experts who have used the EmONC Framework over the last 25 years. They concluded that the original 1997 availability benchmark of 4 basic and 1 Comprehensive EmONC facility per 500,000 population, and even the 2009 revised benchmark of 5 EmONC facilities at least one of which is Comprehensive per 500,000 population, were based on estimates from scenarios that now rarely exist in countries (a scenario in which a substantial number of women delivered at home and health facilities are used mainly to treat complications). However, a benchmark did, in practice, provide a useful reference point, particularly in the prioritization processes conducted in countries with technical support from UNFPA. In these planning exercises countries designated a network of facilities to be supported to deliver EmONC and monitored on a routine basis.(31) Based on these findings, the revised EmONC Framework drops the universal availability benchmark and instead puts forward a 2-step process (a) to set an aspirational benchmark as part of a long-term (10-year horizon) strategic planning process (Indicator 1a, Progress toward long-term goal for EmONC availability); and (b) to designate a set of facilities to be supported to deliver good quality EmONC as part of shorter-term (3-5 year) programme planning cycles with the ultimate goal of reaching the long-term goal (Indicator 1b, Progress toward interim goal for scaling up EmONC availability).

Accessibility measurement: The previous framework applied the benchmark of 5 EmONC facilities per 500,000 population to all sub-national areas, in order to provide a rough sense of the geographic distribution of facilities. With increasing access to geographic information systems, the revised EmONC Framework proposes to use travel time to EmONC facilities as the key variable for determining accessibility. Indicator 7, Home to Comprehensive EmONC within 1 hr measures the proportion of the population within 1 hour travel time from a Comprehensive EmONC facility.

Readiness – equipment, drugs and supplies: A list of candidate drugs, equipment and supplies linked to performance of signal functions was compiled, based on WHO guidance documents and the WHO and

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[4] (1) New set of EmONC signal functions; (2) EmONC commodity readiness; (3) health workforce adequate for caseload; (4) health workforce competency; (5) health workforce wellbeing; and (6) emergency referral readiness.

UNICEF-led Newborn Norms project. (32),(33),(34),(35),(36),(37),(38),(39). While the list of tracer commodities for the neonatal signal functions was finalized as part of the WHO and UNICEF Newborn Norms project, the list of tracer commodities for the obstetric signal functions included in the digital guide are preliminary (as of July 2024). The obstetric-related tracer items will be finalized as part of the WHO and UNFPA Maternal Norms project (forthcoming 2025).

Human resources – adequacy and competency: The previous EmONC framework did not include any measures of human resources adequacy or competency. The need for indicators in this area emerged clearly from the review phase. To start the development process, the project retained Dr. William Stones, who had led the FIGO committee that developed the only existing effort to set facility-based norms for staffing of delivery units by skilled health providers.(40) Dr. Stones conducted a scoping review to search for other potential indicators for staffing levels.(41) He then developed a concept note proposing an adequacy indicator sensitive to caseload, based on full-time effort (FTE) per shift. A second concept note put forward the idea of Qualified in Service (QIS) as a way to assess competency. QIS covers both authorization and demonstrated competency to perform each of the signal functions.

Dr. Stones' initial work was then picked up by a project consultant, nurse-midwife Dr. Peter Johnson. He consulted with multiple professional associations (ICM, ICN, COINN, ECSA) as well as the human resources for health and midwifery departments at WHO, and maternal health team at UNFPA, to assess need for such norms and to identify any ongoing efforts to develop them. Dr. Johnson then wrote briefs operationalizing the concepts first developed by Dr. Stones and expanding to health worker teams needed in Comprehensive and Intensive EmONC facilities (i.e., surgical, blood transfusion and neonatal care teams). (42),(43) These briefs were shared with the same group of professional associations and WHO colleagues, as well as with some Steering Committee members. The chapters in the Guide and associated data collection forms are based on those briefs.

The human resources indicators were then piloted in Senegal. The indicators were well-received by health facility staff who found the data collection feasible and straightforward.

The Newborn Norms project led by UNICEF and WHO examined norms for staffing of inpatient newborn care units with a focus on nursing.(44) Indicator 4, Health workforce adequate for caseload included in the revised EmONC Framework incorporates these norms. A group being led by WHO and UNFPA are in the process of developing norms for maternal health staffing (forthcoming 2025). Once final, the maternal staffing norms will also be incorporated into Indicator 4.

The Steering Committee ultimately recommended against including the QIS indicator (measuring competency) as one of the main EmONC indicators. The competency assessment process proposed to calculate the indicator was intended to rely on overarching (non-EmONC-specific) competency maintenance systems already in use in countries, but there were concerns that many countries may not have these systems in place. If that were the case, then calculating the indicator would require a standalone EmONC competency assessment. Rather than recommending an indicator that may inadvertently encourage a vertical, siloed approach to competency assessment, the QIS indictor was instead proposed as a supplemental study (see the chapter on Indicator 4, Health workforce adequate for caseload).

Human resources – health worker wellbeing: The project retained Dr. Rima Jolivet to lead a process to develop indicators on health worker wellbeing for the revised EmONC Framework. The methodology to develop these indicators is described in detail in the paper prepared for publication.(45) The goal was to

develop one or two indicators covering individual wellbeing and team wellbeing. The process included multiple rounds of scoping reviews first to identify candidate concepts, followed by multiple rounds of consultation to prioritize concepts. This was followed by further scoping reviews to identify measures for each prioritized concept. Finally, this was followed by additional rounds of consultation to identify which prioritized constructs and measures are best suited for the EmONC Framework, where the goal is to raise red flags when there are serious problems. Three constructs were selected during this process – burnout, moral distress and psychological safety – with 1-3 item scales recommended for each.

Based on this extensive review process, a set of three indicators on burnout, moral distress and psychological safety were developed and then piloted in Senegal using an online survey platform. The survey link was sent to the five health facilities participating in the pilot (see above) and providers were asked to anonymously complete a questionnaire containing the scales for each of the selected constructs. While the number of respondents was small (21 health providers), this exercise was invaluable in assessing the indicators' potential feasibility and utility.   Respondents were also asked to provide feedback about their experience filling out the survey and about the construct scales themselves and most respondents were appreciative that they were asked about their wellbeing.

Although the intention behind selecting multiple (three) constructs had been to better capture the multi-dimensional nature of wellbeing, the Steering Committee ultimately decided to focus on only one construct for the sake of maintaining a parsimonious set of indicators. The Steering Committee selected burnout based on the results from the Senegal pilot, which suggested respondents had more difficulty completing the moral distress and psychological safety scales.

This decision led us to revisit an earlier assumption in the process – that using full existing scales for each wellbeing construct would produce a questionnaire that was too lengthy to be acceptable for routine (e.g. annual) use. With the decision to focus on only one construct (burnout), we instead set out to identify a full existing burnout scale that (1) had been validated in low/middle income settings, (2) was short, and (3) captured the sub-constructs of burnout (physical exhaustion, emotional exhaustion, depersonalization) that had been selected through the earlier scoping reviews and prioritization processes (described above). The Shirom-Melamed Burnout Measure was selected based on these criteria and Indicator 12, Health workforce wellbeing was constructed around this scale.

Referral: The project supported the existing Transport and Referral Community of Practice (CoP), led by Loveday Penn-Kekana and its management team to propose ways that the EmONC Framework could assess the referral system and encourage steps to improve it. The inclusion of a referral signal function was first proposed at the in-person meeting on signal functions held in May 2022, and then upheld at the in-person workshop in September 2022. Based on literature reviews and the review of data from national EmONC assessments, the Transport and Referral CoP also developed a scale to assess emergency referral readiness.(46) The scale is presented in 3 levels of emergency referral readiness – essential, improved, advanced – to stimulate improvement and align with the concept of the obstetric and perinatal transition. It was presented at IMNHC in May 2023, and was pilot tested in Senegal in November 2023 and in Mozambique in April-May 2024. Both pilot tests showed that this indicator was well accepted by facilities as a comprehensive method to identify bottlenecks for referral.

Togetherness: Emerging from global work on quality of in-patient care for small and sick newborns, is the concept of "zero separation", the need to ensure that the mother, or as necessary other family member, is able to stay with a small or sick newborn 24 hours a day, 7 days a week.(47) Led by Louise Tina Day and Emma Sacks, the project convened an expert meeting to consult on potential indicators to

capture this concept, as a means of measuring experience of care for newborns as well as their families. (Women's experience of care is also captured in the new PCMC indicator, described earlier as part of Workstream 3's work under 'Review'.) A literature review was conducted to identify potential indicators, and a brief presenting various options for indicators was written.(48) A thematic session at IMNHC provided the opportunity to discuss potential indicators with others in the field. The indicator based on allowing family 24/7 access to SNCUs and NICUs was selected as most appropriate for the EmONC Framework, recognizing that supplemental studies would be required to determine how consistently mothers (or other family members) actually stay with small or sick newborns.

Steering Committee in-person finalization workshop: A first draft of the EmONC Guide was circulated to the Steering Committee in early November 2023, seeking feedback from the sponsoring agencies and other key participants in the process. The Steering Committee and several key workstream members then met on 29 November – 1 December, 2023 in Istanbul, Türkiye to finalize the EmONC Framework and provide input on the Guide. Important outcomes of the meeting included:
- The Framework should have a smaller number of indicators. General consensus was reached on which indicators to remove from the Framework and, of those, which to incorporate in the text as supplemental studies.
- The Guide should be divided into a Part A focused on the conceptual basis for the Framework and a Part B covering the operational guidance.
- Human resources is a critical piece missing from the previous framework and must be incorporated in the Guide. The challenge will be how to frame provisional indicators that have not yet been formally validated.

A second draft of the EmONC Guide was circulated to the Steering Committee in January (Part A) and February (Part B) 2024. The current version of the EmONC Guide (both digital and in PDF format, as launched in ** 2024) is based on the Steering Committee members' review and feedback.

The EmONC Guide is meant to be a living document in an evolving field. The digital version of the Guide will be updated as new norms and guidelines are developed.

Table 1. List of participants in Re-visioning EmONC process

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Name	Affiliation	Location	Re-Visioning EmONC Role
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Name	Affiliation	Location	Re-Visioning EmONC Role
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