Instructions for using the Long-term EmONC Calculator

The Long-term EmONC Calculator helps countries plan how many EmONC facilities are needed over the long-term (10-year horizon) to ensure there are enough services to meet the needs of every woman and newborn. It is intended to be used by a group of relevant stakeholders who together can make decisions about their health system as part of national and sub-national planning processes. The Calculator works by testing various long-term scenarios for childbirth and in-patient newborn care, using variables specific to each country or sub-national area. For each long-term scenario, it calculates the number of EmONC facilities that will be needed to meet the needs of the entire population in the selected geographic area.

The Calculator asks for the following inputs:

- **Area for scenario planning:** Users should first identify the geographic area for which they are doing the scenario planning exercise. This could be a whole country or a sub-national area within a country. The area can be defined by administrative boundaries or more generally, such as urban/rural. It is recommended that the selected area have at least 10,000 annual births to make the scenario planning exercise meaningful.

- **How many annual births do you expect to occur in this area 10 years from now?** The Calculator uses a 10-year time horizon for scenario planning because this is a common timeline for strategic planning. Users can calculate the estimated number of annual births in 10 years by multiplying the selected area's projected population by its projected birth rate.

- **Where do women give birth in this area?** Users are asked to input a percent distribution for the location of deliveries in the selected area. The four options for delivery locations are:
    - Hospitals – This includes any facilities with surgical capacity.
    - Non-hospitals with ≥600[a] births/year – This includes any facilities without surgical capacity that have an annual delivery volume of ≥600 births.
    - Non-hospitals with <600[a] births/year – This includes any facilities without surgical capacity that have an annual delivery volume of <600 births.
    - At home

  100% of deliveries in the selected area should be captured within one of these four settings. Users are first asked to input the current percent distribution (i.e., where women deliver now), and then are asked to imagine three different scenarios for what the distribution might look like in 10 years.

[a] 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 a number of previous EmONC assessments shows that non-hospitals performing all maternal signal functions from the 2009 EmONC Framework had a median of 53 deliveries per month, which would translate to approximately 600 deliveries per year. (See analysis in Re-visioning EmONC process and evidence base for revised EmONC Framework, pgs.10-11.)

- **On average, how many delivery beds are there in each facility in this area?** The Calculator uses the number of delivery beds in facilities to estimate the annual number of births those facilities can accommodate. The number of delivery beds should be provided for the first two delivery locations described above: hospitals and non-hospitals with ≥600 births/year. It is not necessary to provide the number of delivery beds for non-hospitals with <600 births/year because these facilities will not factor into the Calculator's estimation model. (See assumption 1 below.)

  There are various types of "hospitals", with a wide range in the number of delivery beds. When estimating an average number of delivery beds per hospital, users should consider how many of each type/size of facility there are, and account for that in the calculation. (e.g., A tertiary/regional hospital may have 10 beds, whereas a district hospital may have 6, but there are more district than tertiary/regional hospitals, so the average should be closer to 6 than 10.) The same applies for estimating the average number of delivery beds in "non-hospitals with ≥600 births/year".

  Users are first asked to estimate the current number of delivery beds in each type of facility, and then are asked to imagine three different scenarios for how many delivery beds those facility types might have in 10 years.

- **What do you expect your population caesarean section rate to be in 10 years?** The Calculator offers some cross-checks for each scenario (see more detail on this below), one of which is the number of caesarean deliveries that each surgical facility might be expected to do per day, given the assumptions made for that scenario. In order to run that cross-check, users must estimate what the population caesarean rate might be in 10 years. Please note that this question is not asking about the facility caesarean rate (i.e., # caesareans in facilities / # total births in facilities), but rather the population caesarean rate (i.e., # caesareans in population / # total births in population). Whereas the rest of the inputs described above are entered in the 'Scenario planning' tab of the Calculator, the caesarean rate is entered in each of the 'Results-Scenario [A/B/C]' tabs.

In addition to the information country planners provide (described above), the Calculator relies on the following assumptions to generate results:

1. In the long term, countries should plan to have sufficient delivery capacity in EmONC facilities for all women to deliver in either a Basic EmONC (BEmONC) or Comprehensive EmONC (CEmONC) facility, as there is growing consensus that all women should give birth at a facility that can provide, at minimum, Basic EmONC. It is therefore recommended for long-term goals to be set with the expectation that all women will eventually deliver in facilities with at least 600[a] deliveries per year. This assumption is represented in the Calculator in the 'Scenario planning' tab by the greyed-out cells for "non-hospitals with <600 births/year" and "at home" for each of the future scenarios.

2. Countries should also plan to have enough special newborn care unit (SNCU) beds to accommodate all newborns requiring that level of care. The WHO recommends that countries should have 24 SNCU beds for every 10,000 births.[(1)]

3. It is assumed that all hospitals (i.e., facilities with surgical capacity) have the potential to become CEmONC facilities, and all non-hospitals (i.e., facilities without surgical capacity) with ≥600[a] births per year have the potential to become BEmONC facilities.

4. The calculations build on the delivery bed standards in "FIGO Statement: Staffing Requirements for Delivery Care, With Special Reference to Low-and-Middle-Income Countries"[(2)] (Table 1). Although the FIGO recommendations describe "individual delivery rooms", some settings may not have private rooms for each delivery bed, so the Calculator instead asks for the number of delivery beds (see

above). It then translates that number into the facility capacity (births per year) that can be accommodated with that number of delivery beds. For example, if a hospital has 2 delivery beds (see righthand column below), the Calculator would translate that to a capacity of approximately 1,000 births per year (see lefthand column below), or 2-3 births per day.

Table 1: FIGO delivery bed requirements (adapted from Stones et al, 2019[2])

Births per year	Births per day	Minimum number individual delivery rooms	
		Health center with no surgical facilities ("Basic EmONC")	Hospital with surgical facilities ("Comprehensive EmONC")
±1000	±3	2	2
±2000	±6	3	3
±3000	±8	4	4
±5000	±14	NA	6
±7000	±19	NA	8

NA = not available

5. The calculations also build on the WHO recommendation that SNCUs should have no fewer than 12 beds, and no more than 24 beds.[1]

The Calculator is structured to allow planners to consider three different scenarios, so that different assumptions about the future can be tested. Scenarios should vary by the sizes of facilities and/or where women give birth, while considering potential changes related to demographics and health system design. Based on the inputs for each of the three scenarios and the modeling assumptions described above, the Calculator will produce a recommended number of BEmONC and CEmONC facilities needed in the long-term to meet the needs of all birthing women and newborns. For the purposes of the Calculator, the recommended number of CEmONC facilities includes both Comprehensive EmONC and Intensive EmONC facilities, as Intensive EmONC facilities should be able to provide all the EmONC services available in a CEmONC facility. At this time, no global standard exists for how many Intensive EmONC facilities are needed to meet population needs, but countries may wish to set their own targets for the number of intensive care units needed for very sick newborns and birthing women with severe complications.

The Calculator produces BEmONC and CEmONC recommendations for the country as a whole, and also per 20,000 births to aid with sub-national planning. If population density varies throughout the country, it is recommended to use the Calculator to complete the entire exercise for each sub-national area separately, and then to aggregate the results to determine the total number of facilities needed at national level.

To ensure that the number of EmONC facilities makes sense given the country context, two cross-checks can be performed.

- The first considers the projected population cesarean rate and the average number of cesarean sections that would be expected each day in a single CEmONC facility. This helps to determine the plausibility of the infrastructure (operating theaters per facility) and human resources (surgical teams) needed to accommodate that number of cesareans in each facility. If the projected volume of cesareans per facility seems too high, more CEmONC facilities may be needed or the capacity of existing CEmONC facilities may need to be expanded (e.g., construction of additional operating theaters, additional surgical teams).

- The second cross-check advises countries to consider the cost implications of various scenarios. Since costs associated with upgrading facilities, increasing their capacity (number of delivery beds), or building new facilities will differ from one country to another, the Calculator does not include a costing model for each scenario. Countries are advised to use their own experience or best estimates to consider the cost implications of various scenarios.

Planners should review the results and cross-checks for all long-term scenarios, and make adjustments if desired. The ultimate goal is to select one of the scenarios to serve as the country's long-term goal for the number of EmONC facilities that will be needed.

The recommendations produced by the Calculator are meant to be ambitious. Though many countries may currently be far from that aspirational goal, if they wish to reach it in the long term, then planning should reflect that aspiration. Even if the variables used in the Calculator are imprecise projections of what a country's health system will look like 10 years in the future, the resulting recommendations can nevertheless give planners a rough sense of what would be needed for all women and newborns to have ready access to EmONC services. The Long-Term Calculator also makes it simple to revise the projection if assumptions about where women will deliver or the average number of beds per facility change over time.

References

[1] WHO, UNICEF. Norms for care of small and sick newborns. Forthcoming.

[2] Stones W, Visser GHA, Theron G; FIGO Safe Motherhood and Newborn Health Committee. FIGO Statement: Staffing requirements for delivery care, with special reference to low- and middle-income countries. Int J Gynaecol Obstet. 2019 Jul;146(1):3-7. doi: 10.1002/ijgo.12815. Epub 2019 Apr 12. PMID: 30927443.