Current Set of Emergency Obstetric Care (EmOC) Indicators:

From "Monitoring emergency obstetric care: A Handbook" (WHO, 2009)

Indicator Brief #8:
Proportion of maternal deaths due to indirect causes in EmOC facilities

INDICATOR	ACCEPTABLE LEVEL
1. Availability of EmOC: basic & comprehensive facilities	At least 5 EmOC facilities (including at least 1 comprehensive facility) for every 500,000 population
2. Geographic distribution of EmOC facilities	All subnational areas have at least 5 EmOC facilities (including at least 1 comprehensive facility) for every 500,00 population
3. Proportion of all births in EmOC facilities	Minimum acceptable level to be set locally
4. Met need for EmOC: 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
5. 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%
6. Direct obstetric case fatality rate	The case fatality rate among women with direct obstetric complications in EmOC facilities is less than 1%
7. Intrapartum and very early neonatal death rate	Standards to be determined
8. Proportion of maternal deaths due to indirect causes in EmOC facilities	No standard can be set

Indicator 8: Proportion of [maternal] deaths due to indirect causes in EmOC facilities

In addition to EmONC, what interventions are needed to address maternal mortality?

Background

This indicator was added to the set of indicators in the 2009 revision to highlight the larger social and medical context of a country or region and to ensure that maternal mortality reduction strategies and plans included addressing the causes of indirect maternal deaths. This was particularly important in countries with high prevalence rates of malaria, tuberculosis and/or HIV/AIDs during pregnancy.

A substantial proportion of maternal deaths in most countries are due to indirect causes. The most recent systematic study of the causes of maternal death was published in 2014 by researchers at WHO.[1,*] Table 1 summarizes the proportions of direct and indirect causes of death by world region. It shows that globally, 28% of maternal deaths are due to indirect causes. The study states that upon further analysis of deaths due to indirect causes, 70% of deaths were from pre-existing disorders, including HIV, that were exacerbated by pregnancy. It also states that HIV alone accounted for 5.5% of global maternal deaths (Table 2).[1]

Indirect causes of maternal death are becoming a more prominent issue in countries and in areas that are farther along in the obstetric transition.[2] These are places that have successfully addressed the management of preventable direct causes of maternal mortality and where non-communicable diseases / pre-existing conditions (e.g., cardiovascular disease, diabetes, severe anemia) as well as prevalent infectious diseases (e.g., TB, HIV, malaria) may emerge as more frequent causes of maternal death.

Table 1: Estimates of direct and indirect causes of maternal death by region, 2003-2009[1]

	Abortion	Embolism	Hemor-rhage	Hyper-tension	Sepsis	Other direct causes	Total direct	Indirect causes
Worldwide	7.9%	3.2%	27.1%	14.0%	10.7%	9.6%	72.5%	27.5%
Developed regions	7.5%	13.8%	16.3%	12.9%	4.7%	20.0%	75.2%	24.7%
Developing regions	7.9%	3.1%	27.1%	14.0%	10.7%	9.6%	72.4%	27.5%
Northern Africa	2.2%	3.2%	36.9%	16.9%	5.8%	17.1%	82.1%	18.0%
Sub-Saharan Africa	9.6%	2.1%	24.5%	16.0%	10.3%	9.0%	71.5%	28.6%
Eastern Asia	0.8%	11.5%	35.8%	10.4%	2.6%	14.1%	75.2%	24.9%
Southern Asia	5.9%	2.2%	30.3%	10.3%	13.7%	8.3%	70.7%	29.3%
Southeastern Asia	7.4%	12.1%	29.9%	14.5%	5.5%	13.8%	83.2%	16.8%
Western Asia	3.0%	9.2%	30.7%	13.4%	4.8%	15.6%	76.7%	23.4%
Caucasus and central Asia	4.6%	10.9%	22.8%	14.7%	8.5%	16.8%	78.3%	21.8%
Latin America and Caribbean	9.9%	3.2%	23.1%	22.1%	8.3%	14.8%	81.4%	18.5%
Oceania	7.1%	14.8%	29.5%	13.8%	5.0%	12.4%	82.6%	17.4%

[*] The 2014 study is an update of an earlier study conducted by the WHO in 2006 (Khan KS et al. WHO analysis of causes of maternal death: A systematic review. Lancet, 2006, 367(9516):1066-1074); information from the 2006 study was included in the 2009 Handbook. Because of methodological differences, estimates of indirect maternal deaths from the two studies are not comparable.

Table 2: Indirect causes of maternal death[1]

	HIV-related	Pre-existing medical conditions	Other indirect causes	Total Indirect causes
Worldwide	5.5%	14.8%	7.2%	27.5%
Developed regions	2.7%	20.3%	1.7%	24.7%
Developing regions	5.5%	14.8%	7.3%	27.5%
Northern Africa	3.4%	12.4%	2.2%	18.0%
Sub-Saharan Africa	6.4%	12.8%	9.3%	28.6%
Eastern Asia	3.9%	20.7%	0.2%	24.9%
Southern Asia	4.8%	18.2%	6.3%	29.3%
Southeastern Asia	4.0%	11.8%	1.0%	16.8%
Western Asia	4.2%	16.9%	2.2%	23.4%
Caucasus and central Asia	2.3%	16.9%	2.5%	21.8%
Latin America and Caribbean	1.8%	14.0%	2.6%	18.5%
Oceania	4.2%	12.3%	0.9%	17.4%

Definition and calculation of the indicator

The "proportion of deaths due to indirect causes in EmOC facilities" is an estimate of the proportion of maternal deaths that are due to causes beyond those defined as direct[2] that occur in facilities classified as EmOC. The calculation of this indicator is as follows:

> Numerator: Number of maternal deaths due to indirect causes in EmOC facilities in a specified time period and area.
>
> Denominator: Number of all maternal deaths (direct and indirect causes) in the specified period and area and in the same facilities.

The 2009 Handbook provided the following definitions to assist countries with data collection for this indicator:

- Indirect causes of death result from 'previous existing disease or disease that developed during pregnancy and which was not due to direct obstetric causes, but which was aggravated by the physiologic effects of pregnancy.'[3]
- Direct causes of death are those 'resulting from obstetric complications of the pregnant state (pregnancy, labour, and puerperium), from interventions, omissions, incorrect treatment, or from a chain of events from any of the above.'[3]
- Other categories of maternal death (death after 42 days postpartum, fortuitous, coincidental or incidental deaths) are generally not included in the calculation of maternal death rates or ratios, and they are excluded for the purposes of this indicator.[3]

[2] Hemorrhage, postpartum sepsis, prolonged/obstructed labor, severe pre-eclampsia / eclampsia, ruptured uterus, ectopic pregnancy and complications of abortion.

Assumptions

Maternal deaths and their causes, which are collected for the numerator and denominator, are accurately and consistently recorded in health facility registers and/or other patient records and are easily extracted.

Methodological issues

Maternal deaths and their causes are likely to be underreported, especially in countries with less developed vital registration systems. Issues that can lead to underreporting include: missing cause of death (e.g., in the Ethiopia 2016 EmONC assessment, over 50% of maternal deaths were coded as 'unknown cause'[4]), misclassification of cause of death (direct vs. indirect especially in cases where there are more than one complication), and omission of recent pregnancy status on death certificates (when that is used as the source of data). Maternal deaths that occur during pregnancy and postpartum may also be difficult to find because they often happen outside obstetric wards. In addition, maternal deaths due to cardiac disease, which are important causes of indirect maternal mortality in countries like the UK and USA,[5] are infrequently reported in low- and middle-income countries due to inadequate diagnostic means and poor registration.[6–9]

Lessons learned from experience with the indicator

- Needs assessments have been collecting data for this indicator for over 10 years; Table 3 presents data from select EmONC assessments. In addition to calculating the indicator for EmONC facilities, most EmONC assessment reports also present the indicator for all facilities. In some places, this indicator can be compared for two time periods.
- Recommendations at the end of most assessment reports very rarely include specific actions targeting indirect causes of maternal death.
- There is one published article about EmONC in Mozambique where authors wrote about this indicator; they presented maternal deaths due to indirect causes doubling from 2007 to 2012 (from 23% to 50%) and pointed out that this should serve as a call for planners and officials to do more to prevent and treat malaria, HIV and anemia during pregnancy. However, they also discuss other factors that could have caused the increase in indirect maternal deaths, including improved data collection on malaria and HIV and changes in the way that co-morbidities are combined, categorized and classified.[10] Another article on Mozambique using the same data sets delves deeper into causes of maternal mortality.[11] The authors wrote that more than 40% of maternal deaths that were recorded as being due to direct causes also had evidence of co-morbidities such as HIV or malaria.
- It is unclear whether countries have integrated this indicator into their routine data collection systems.

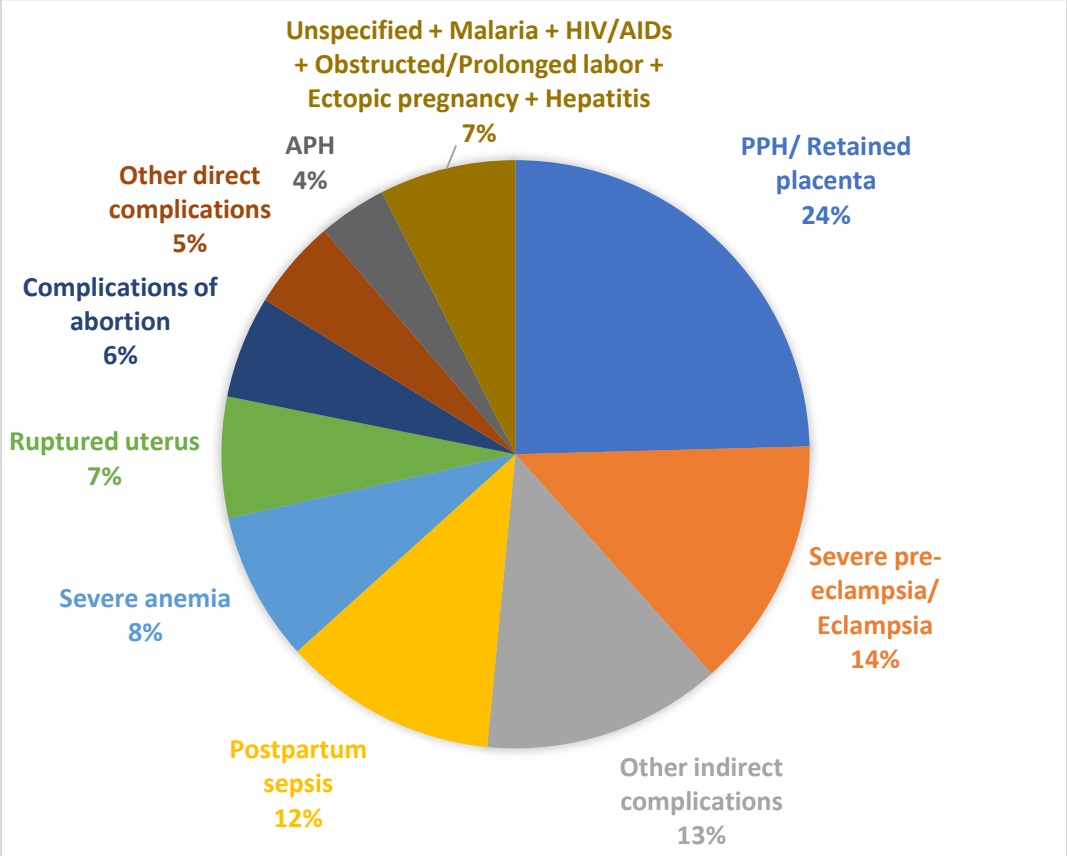
Table 3: Proportion of deaths due to indirect causes in EmOC facilities and all facilities[4,12–16]

Country	Year	% indirect deaths - all facilities	% indirect deaths - EmONC facilities
Cambodia	2020	8.3	7.3
Ethiopia	2016	5.0	7.0
Ghana	2010	27.0	23.0
Malawi	2020	25.0	26.0
Mozambique	2012	49.0	51.0
Zambia	2014	30.4	22.8

Going forward

- As more countries and/or areas of countries transition, an indicator that puts focus on indirect causes of maternal death will become more important. However, since this indicator has not been as useful as originally hoped, we think that this indicator should be replaced with a presentation of the specific causes of maternal death, that shows both direct and indirect causes (Figure 1). This would allow planners and implementers to tailor strategies and programs to address the most common causes of maternal death. In addition, we suggest a similar presentation of the causes of early neonatal deaths (before discharge).

Figure 1: Causes of maternal death, Malawi 2020 (N=586 maternal deaths)[17]



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