

Maternal Near Miss

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How big is the problem of maternal mortality?

- Each year, an estimated 529 000 maternal deaths occur.
- Reliable trend data are not available for countries with high levels of maternal mortality.
- In the last 30 years there is little to suggest any progress, especially in sub-Saharan Africa.



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How big is the problem of maternal mortality?

- 2000: 189 countries endorsed the Millennium Declaration and signed up to meeting eight goals.
- One of these Millennium Development Goal is to “improve maternal health”
- Reduction of the maternal mortality ratio by three-quarters by 2015 is the target



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Reducing maternal mortality: is it possible?

- Some countries tell an encouraging story
- Substantial falls in maternal mortality are feasible :
 - a 75% decline can be achieved



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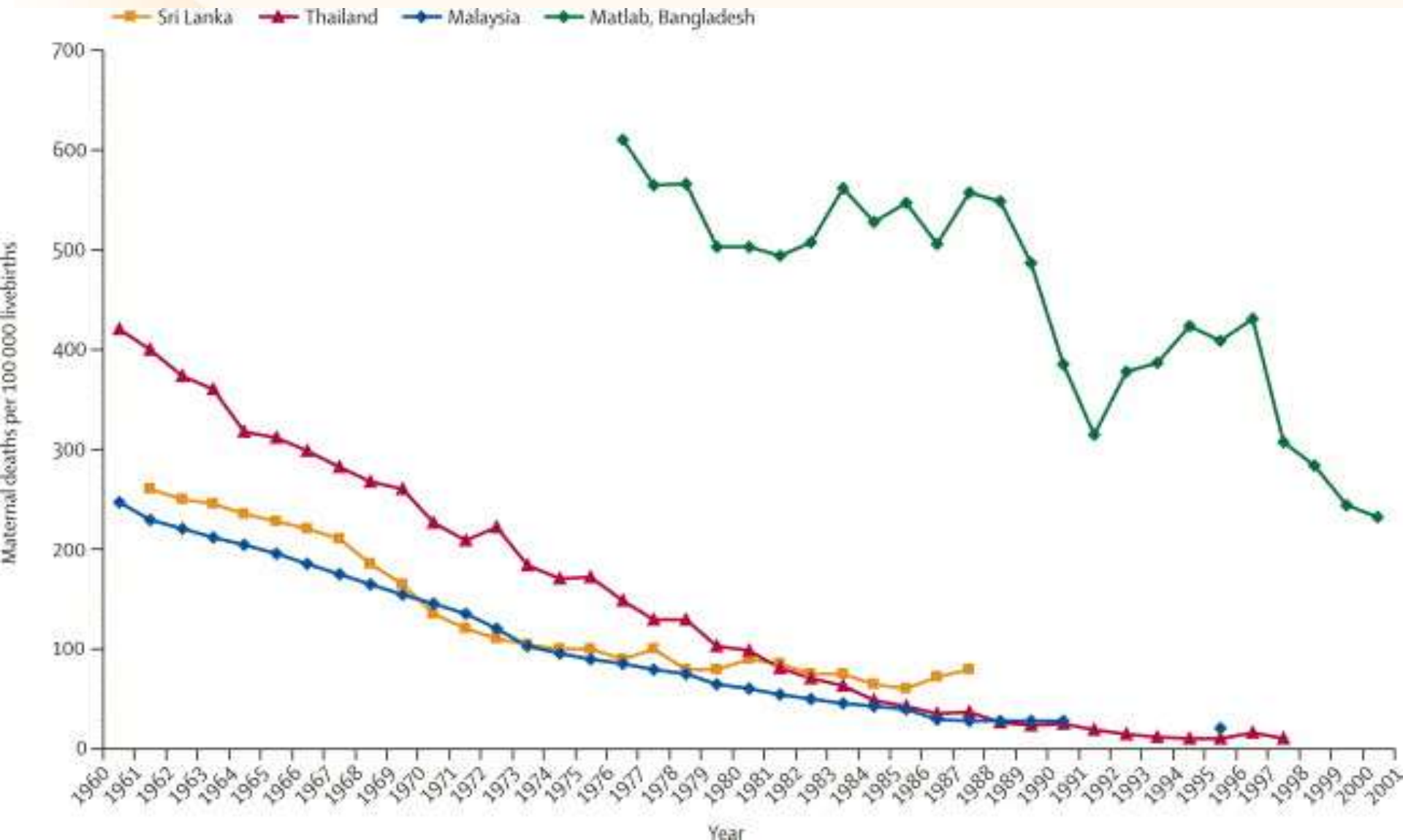


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Trends in maternal mortality in Thailand, Malaysia, Sri Lanka, and Matlab, Bangladesh



Reducing maternal mortality: is it possible?

Thailand

- 1960: MMR= 400 deaths per 100 000 livebirths
- 1984: MMR= 50 deaths per 100 000 livebirths
- Malaysia and Sri Lanka: declines in the MMR of more than 50% during this period.



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Reducing maternal mortality: is it possible?

- These achievements are attributed to:
 - long-term investment in midwifery training and referral hospitals;
 - free care
 - supportive system with regulation, control, and supervision of the medical and midwifery profession;
 - and information to confirm progress.



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Reducing maternal mortality: is it possible?

Recent evidence from Egypt and Honduras supports:

- the role of professional training networks
- international policy in stimulating declines in maternal mortality.

Both countries halved their maternal mortality ratio in less than 7 years



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Reducing maternal mortality: is it possible?

Substantial declines in Matlab, Bangladesh:

- 1976: MMR from around 600/100 000 livebirths
- 2001: MMR=200/100 000 livebirths

Attributed causes:

- Increased access to surgical obstetric care
- Reduction in deaths from abortion, lower fertility
- General improvements in health



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Understanding the epidemiology of maternal mortality can help inform strategic choices.



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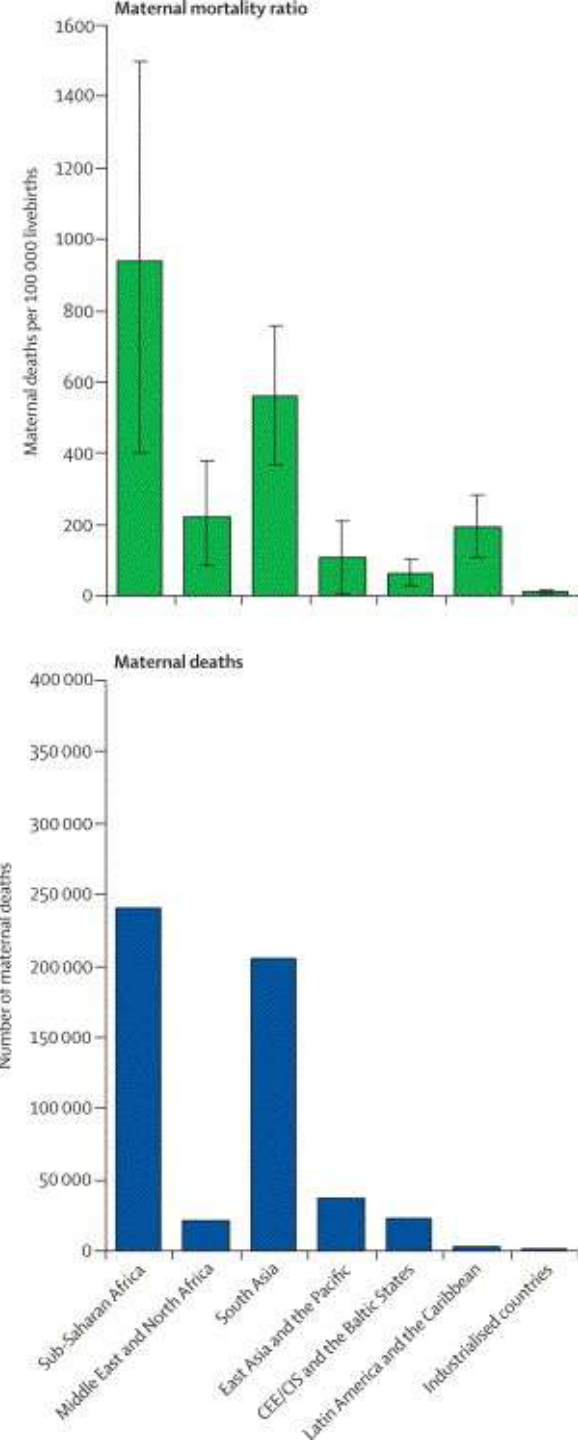
What is the global distribution of maternal mortality?



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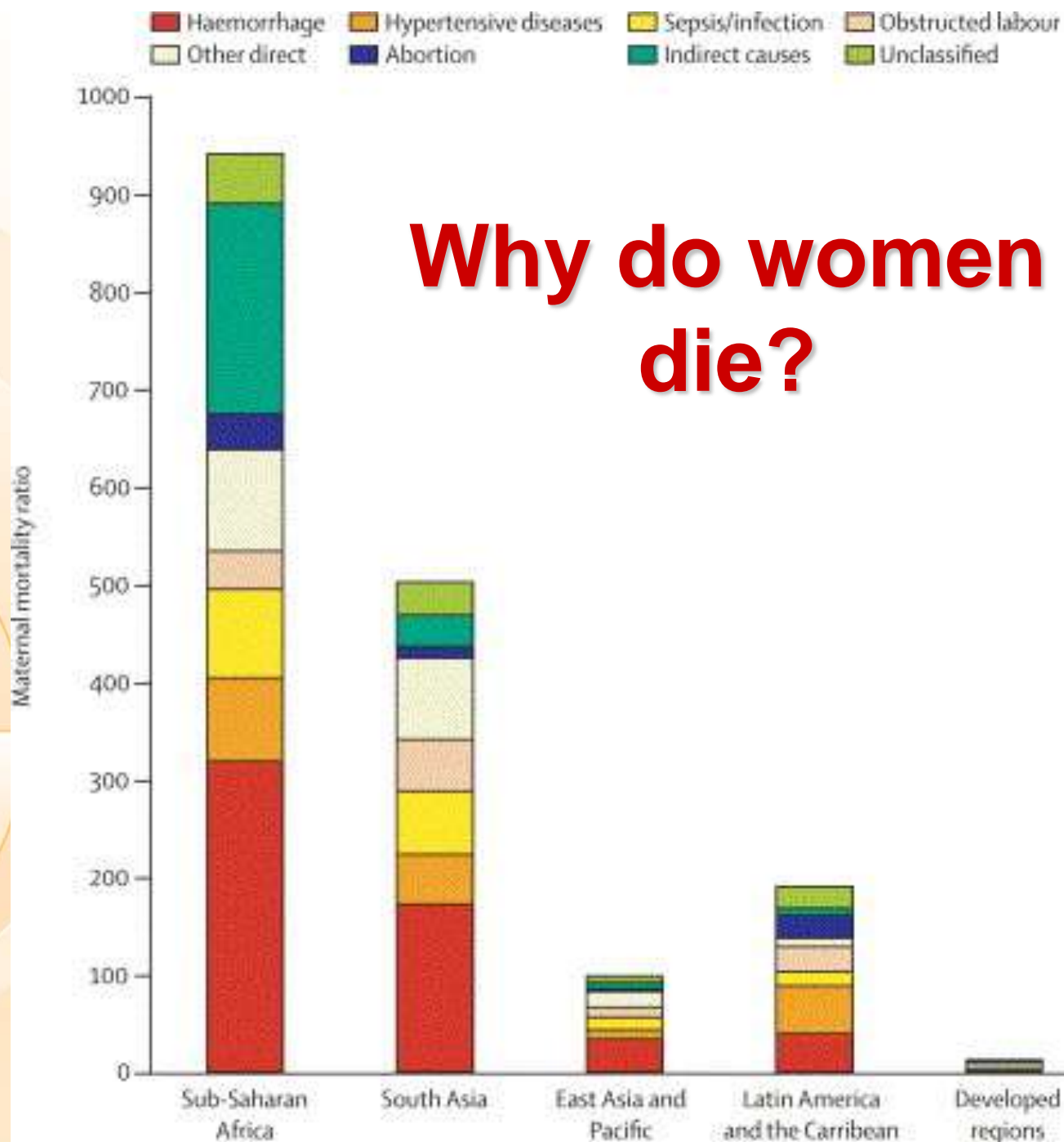


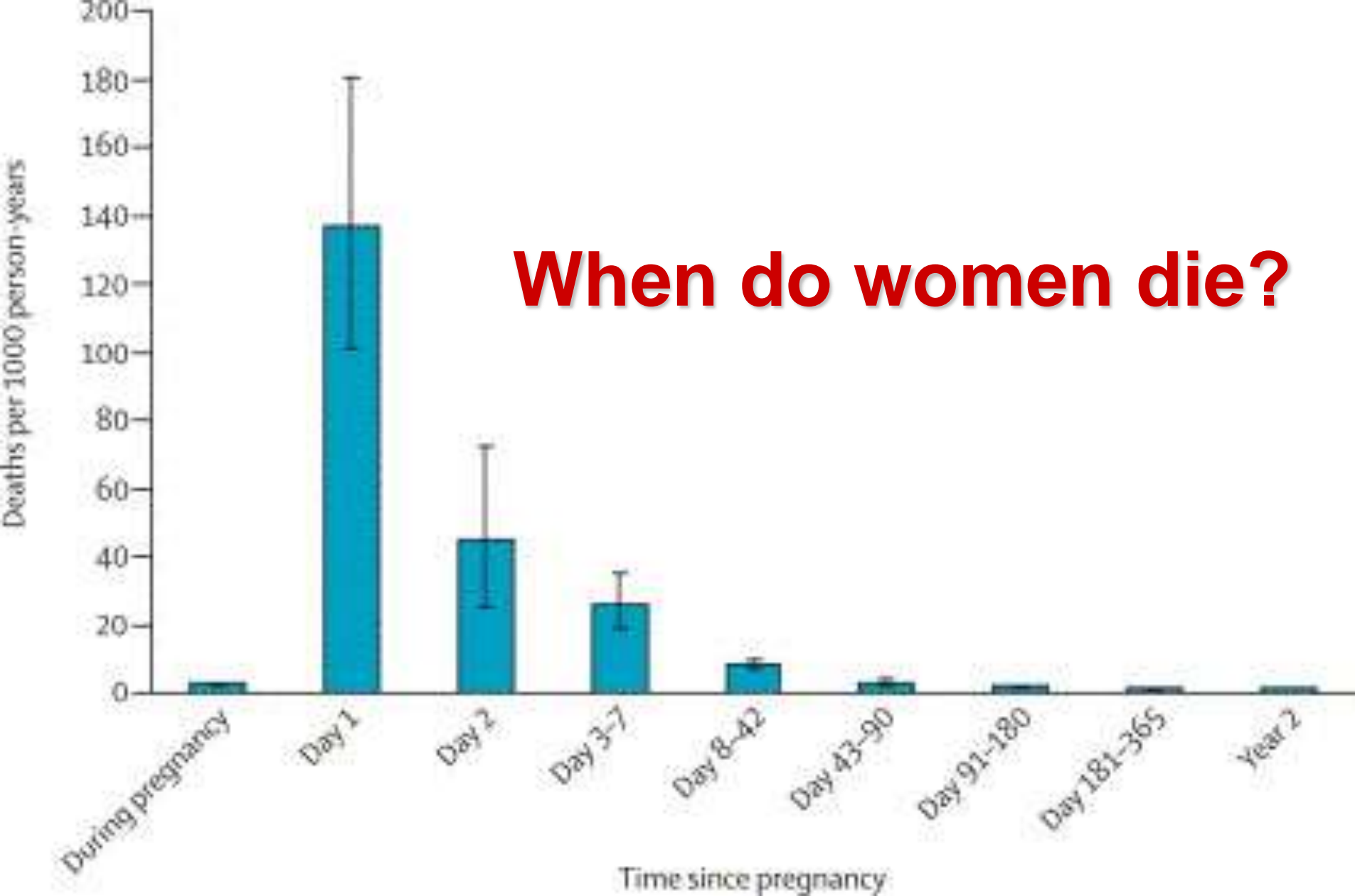
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Why do women die?





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Where do maternal deaths take place?

Table
Location of maternal death: findings from selected studies*

	Years	Number of maternal deaths	In hospital	In other health facilities	At home	In other places
Egypt (national) ⁵³	1992–93	718	424 (59%)	36 (5%)	258 (36%)	..
Pakistan (Faisalabad) ⁵⁴	1989–93	215	145 (67%)	..	70 (33)	..
Zimbabwe (Masvingo province) ⁵⁵	1989–90	26†	14 (54%)	1 (3.8%)	8 (31%)	3 (12%)
Guinea-Bissau ⁵⁶	1996–97	111	50 (45%) (any health facility)	..	45 (41%)	8 (7%) 'travelling'; 8 (7%) 'others'
South Africa (national) ⁵⁷	1998	676	621 (92%)	13 (1.9%)	16 (2%)	10 (2%) private hospitals, 15 (2%) unknown
Surinam (national) ⁵⁸	1991–93	64	53 (83%)	2 (3.1%)	9 (14%)	..
Egypt (national) ⁵⁹	2000	580	360 (62%)	..	168 (29%)	52 (9%) during transport
Zimbabwe (Matebeleland province) ⁶⁰	1998–2001	92	68 (74%) (any health facility)	24 (26%) unspecified
Tanzania (Arusha region) ⁶¹	1995–96	45	40 (89%)	5 (11%) unspecified
Mozambique (Sofala province) ⁶²	1996–97	40	22 (55%) (any health facility)	..	14 (35%)	4 (10%)
Tanzania ²⁷			
Dar es Salaam	1993–99	107	76 (71%)		31 (29%)	
Hai District	1992–99	110	86 (78%)		24 (22%)	
Morogoro District	1992–99	224	98 (44%)		126 (56%)	
Vietnam‡ ⁶³	2000–2001	80	32 (40%)	..	35 (44%)	1 (1%) private clinic, 6 (8%) during transport, 1 (1%) other

Data are number (%) unless otherwise indicated.

* Studies reporting data for ≥25 maternal deaths.

† Deaths due to obstetric haemorrhage only.

‡ Maternal deaths by province; Cao Bang (15), Ha Tay (7), Quang Tri (13), Quang Ngai (7), Dak Lak (22), Binh Duong (5), Kien Giang (11).

How maternal mortality can be reduced?

Key messages to reduce maternal mortality (1997)

- “Every pregnancy faces risks”
 - any pregnant woman can develop life-threatening complications with little or no advance warning,
 - all women need access to quality maternal health services that can detect and manage life-threatening complications



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How maternal mortality can be reduced?

Key messages to reduce maternal mortality (1997)

- “Ensure skilled attendance at delivery”
 - the importance of having a health-worker with midwifery skills present during childbirth,
 - backed up by transport in case of emergency referral required.



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How maternal mortality can be reduced?

Key messages to reduce maternal mortality (1997)

- Traditional birth attendants, trained or untrained, are excluded from the definition of skilled attendants
 - lack of clinical skills, drugs and equipment, or infrastructure to manage complications such as haemorrhage, eclampsia, or severe infection.



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How maternal mortality can be reduced?

Key messages to reduce maternal mortality (1997)

- “Improve access to quality maternal health services”
 - the importance of both clinical and interpersonal aspects of care,
 - including the capacity to provide emergency obstetric care



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How maternal mortality can be reduced?

The current main approaches to the reduction of maternal deaths are:

Emergency obstetric care

Skilled care by skilled attendants

Unmet obstetric need

At the core:

Without the ability to treat women with obstetric complications, maternal mortality cannot be substantially reduced.



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Needed action to reduce MM

Strengthening the local health system to deliver continuous, appropriate and timely life-saving services for women with acute complications during pregnancy, childbirth and postpartum from the community education and services to the referral hospital



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How local health systems can be strengthened?

Two components:

- Information
 - It is necessary to know the health system weaknesses and the obstacles that a women with complications has to face to receive timely and appropriate care.
- Substantial, medium-term funding for field programmes and related research, implemented with the goal of strengthening health systems.



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How to obtain relevant information to local health systems?

- Among other methods, confidential enquiries and maternal death reviews can be good sources of information to identify health system problems associated with maternal deaths.



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How to obtain relevant information to local health systems?

- Among other methods, confidential enquiries and maternal death reviews can be good sources of information to identify health system problems associated with maternal deaths.

But... What about Maternal Near Miss?



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What is a maternal near miss?

- Women who experienced and survived a severe health condition during pregnancy, childbirth or postpartum are considered as near miss or severe acute maternal morbidity (SAMM) cases.
- This concept is of increasing interest to scientific community and health care programme managers in the area of maternal health.



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Why maternal near miss?

- In low maternal mortality settings, maternal morbidity was suggested to be a more useful indicator of obstetric care than mortality almost two decades ago.
- In recent years, evidence from developing country settings suggests a positive contribution of analysing near miss/SAMM cases with a view of understanding health system failures in relation to obstetric care and addressing them.



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Why maternal near miss?

- Near miss/SAMM cases share many characteristics with maternal deaths and can directly inform on obstacles that had to be overcome after the onset of an acute complication.
- Corrective actions for identified problems can be taken to reduce related mortality and long-term morbidity.



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Why maternal near miss?

- Near miss cases are:
 - not as rare as maternal deaths for providing adequate information
 - still rare enough not to overload clinicians and data capturing personnel
- Lack of standard definition and lack of uniform case identification criteria has limited routine and wider implementation of this concept as a standard tool for improving obstetric care.



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Which definition of Maternal Near Miss should I use? How to identify these cases?

Maternal near miss has been defined as:

- a severe life threatening obstetric complication necessitating an urgent medical intervention in order to prevent likely death of the mother;
- any pregnant or recently delivered woman, in whom immediate survival is threatened and who survives by chance or because of the hospital care she received;
- a very ill woman who would have died had it not been that luck and good care was on her side.



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Which definition of Maternal Near Miss should I use? How to identify these cases?

The case identification could be done:

- by clinical criteria related to a specific disease entity such as severe eclampsia or haemorrhage;
- a specific intervention such as admission to an intensive care unit or procedure such as a hysterectomy or massive blood transfusion;
- a method whereby organ system dysfunction such as shock or respiratory distress is identified.



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Which definition of Maternal Near Miss should I use? How to identify these cases?

- The need to arrive at uniform criteria: crucial
- WHO initiated a process in agreeing on a definition and developing a uniform set of identification criteria for near miss/SAMM cases aiming to facilitate the routine use of near miss/SAMM reviews for monitoring and improving quality of obstetric care.



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Which definition of Maternal Near Miss should I use? How to identify these cases?

The main principles that guided the development of identification criteria were:

- they should enable comparison between facilities and over the time;
- be feasible for use in any setting regardless of the development status;
- there should be high thresholds for determining the cases so that the system is not overwhelmed by collection of data on a large number of cases.



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Which definition of Maternal Near Miss should I use? How to identify these cases?

- A working group of external experts in the area of near miss/SAMM examined existing literature, specifications of the three approaches and feasibility for application in a variety of settings.
- The revised versions of the identification criteria and definitions were field tested in two different settings (Brazil and Canada).
- Following the testing, fine adjustments were made.



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Near miss or SAMM?

- "Near miss" and "severe acute maternal morbidity - SAMM" are terms used for a "severe, life-threatening obstetric complication."
- Considering that the term "maternal near miss" best reflects the concept of "nearly dying but surviving", the WHO working group on Maternal Mortality and Morbidity classifications recommends the use of this term instead of SAMM.



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What is the new WHO definition?

- It reconciles the previously mentioned definitions and is aligned with the "maternal death" definition of International Statistical Classification of Diseases (ICD) 10th version.

"A woman who nearly died but survived a complication that occurred during pregnancy, childbirth or within 42 days of termination of pregnancy"



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How to identify maternal near miss cases?

The criteria used to identify maternal near miss cases should:

- be locally usable and relevant
- be stable and replicable
- allow comparisons between different sites, areas or ideally countries.



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How to identify maternal near miss cases?

Three different approaches were in use to identify maternal near miss cases:

- Disease specific criteria (e.g. eclampsia)
 - Organ dysfunction (e.g. persistent oliguria)
 - Management-based (e.g. hysterectomy)
- Each of the three approaches have different advantages and disadvantages



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How to identify maternal near miss cases?

- Disease-specific criteria:
 - are simple to use,
 - but cannot be easily standardized
 - are less-specific/severe (e.g. eclampsia)
- Management-specific criteria:
 - are simple to use
 - less amenable to standardization considering the variability on the availability of the intervention (e.g. ICU admission - different thresholds, bed availability)



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How to identify maternal near miss cases?

- Organ-system dysfunction criteria
 - Require a minimum level of care and basic critical care monitoring facilities (hence limited applicability to very resource-poor settings)
 - Provide a more reliable identification of the real severe cases as variation in defining criteria could be avoided.
- The organ-system dysfunction based approach is considered the most promising frame for establishing a standard set of criteria.



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How to identify maternal near miss cases?

- Organ dysfunction criteria:
 - Need to be supplemented with compatible clinical markers of organ-system dysfunction (feasible to collect in the absence of higher-level amenities) to ensure the usefulness of the tool for low-resource settings.



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What are the identification criteria?

- Failure or dysfunction of any of the vital organ system
 - circulatory, respiratory, cardiac, renal, hepatic, central nervous, metabolic and haematological
 - The thresholds for the markers are mostly derived from the Sequential Organ Failure Assessment score, a tool that has been validated in obstetrical populations and is largely used in the assessment of severely ill patients



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What are the identification criteria?

- A concise and consistent block of clinically based criteria was developed.
- The clinical criteria enable the identification of severe cases using essentially the clinical judgement where laboratory and other techniques are not available.
- A number of management-related markers are also included as means of identifying the cases



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WHO Maternal Near Miss identification criteria

Dysfunctional system	Clinical criteria	Laboratory markers	Management based proxies
Cardiovascular	<input type="checkbox"/> Shock <input type="checkbox"/> Cardiac arrest	<input type="checkbox"/> pH<7.1 <input type="checkbox"/> Lactate> 5	<input type="checkbox"/> Use of continuous vasoactive drugs <input type="checkbox"/> Cardio-pulmonary resuscitation
Respiratory	<input type="checkbox"/> Acute cyanosis <input type="checkbox"/> Gaspings <input type="checkbox"/> Respiratory rate >40 or <6 bpm	<input type="checkbox"/> Oxygen saturation < 90% for ≥ 60 minutes <input type="checkbox"/> PaO ₂ / FiO ₂ <200 mmHg	<input type="checkbox"/> Intubation and ventilation not related to anaesthesia
Renal	<input type="checkbox"/> Oliguria non responsive to fluids or diuretics	<input type="checkbox"/> Creatinine ≥300μmol/l or ≥3.5 mg/dL	<input type="checkbox"/> Dialysis for acute renal failure
Haematologic/Coagulation	<input type="checkbox"/> Failure to form clots	<input type="checkbox"/> Acute severe thrombocytopaenia (<50,000 platelets)	<input type="checkbox"/> Transfusion of ≥ 5 units of blood / red cells
Hepatic	<input type="checkbox"/> Jaundice in the presence of preeclampsia	<input type="checkbox"/> Bilirubin>100 μmol/l or >6.0 mg/dL	
Neurologic	<input type="checkbox"/> Any loss of consciousness not medically induced lasting >6h <input type="checkbox"/> Stroke <input type="checkbox"/> Uncontrollable fit / status epilepticus <input type="checkbox"/> Total paralysis		
Alternative severity proxy			<input type="checkbox"/> Hysterectomy following infection or haemorrhage

WHO Maternal Near Miss identification criteria

A woman who survived a complication that occurred during pregnancy, childbirth or within 42 days of termination of pregnancy and presented **any** of the life-threatening conditions listed in the previous slide should be classified as a maternal near miss case.



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Maternal Near Miss surveillance

- From the theoretical standpoint, a woman can only be recognized as a maternal near miss case retrospectively.
- Per definition, a woman needs to survive the severe complication to become a maternal near miss case.



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Maternal Near Miss surveillance

- However, it was considered clinically useful to have the possibility of prospectively identifying the women presenting life-threatening conditions.
- Thus, at the end of the process, a woman with a life-threatening condition will become or a maternal near miss case or a maternal death.



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Maternal Near Miss surveillance

- To optimize the efforts of surveillance a list of potentially life-threatening conditions was developed
- This list could be useful to implement a prospective surveillance on severe complications among which maternal near miss cases would emerge



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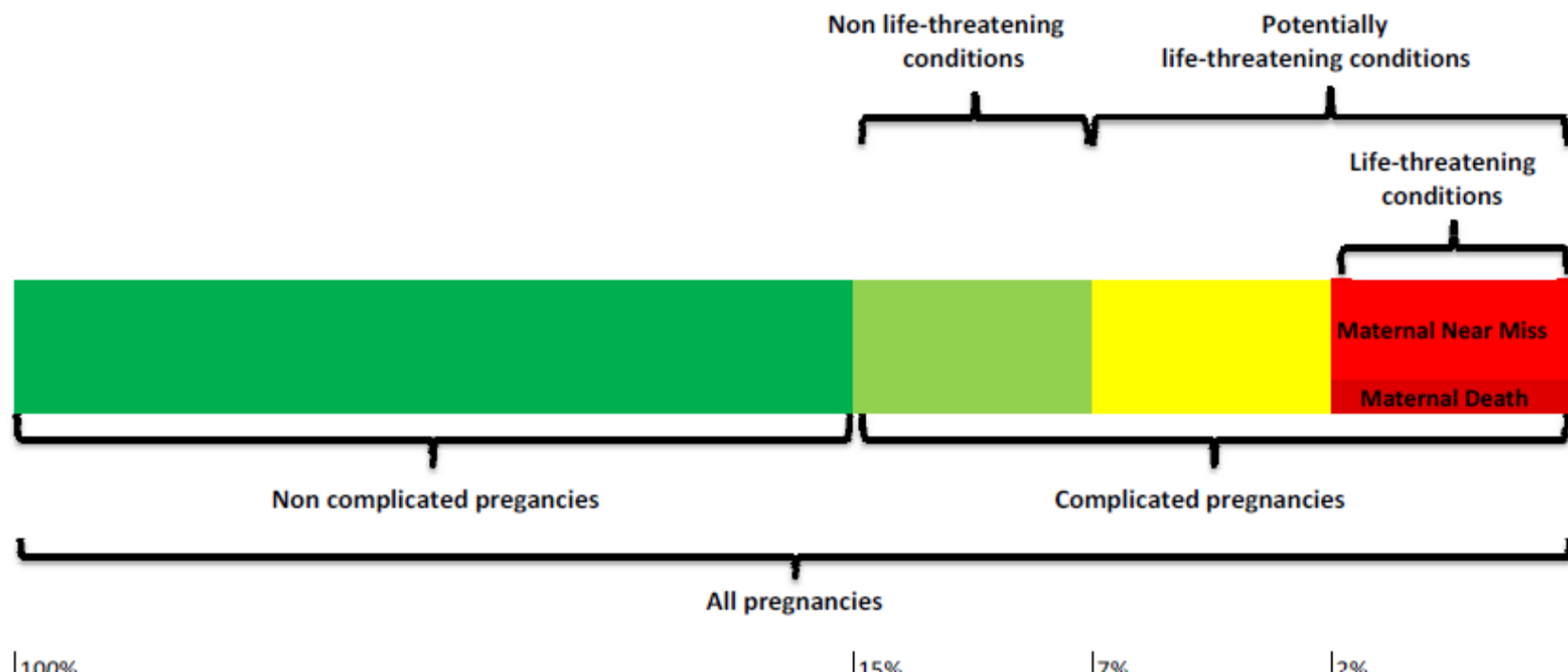
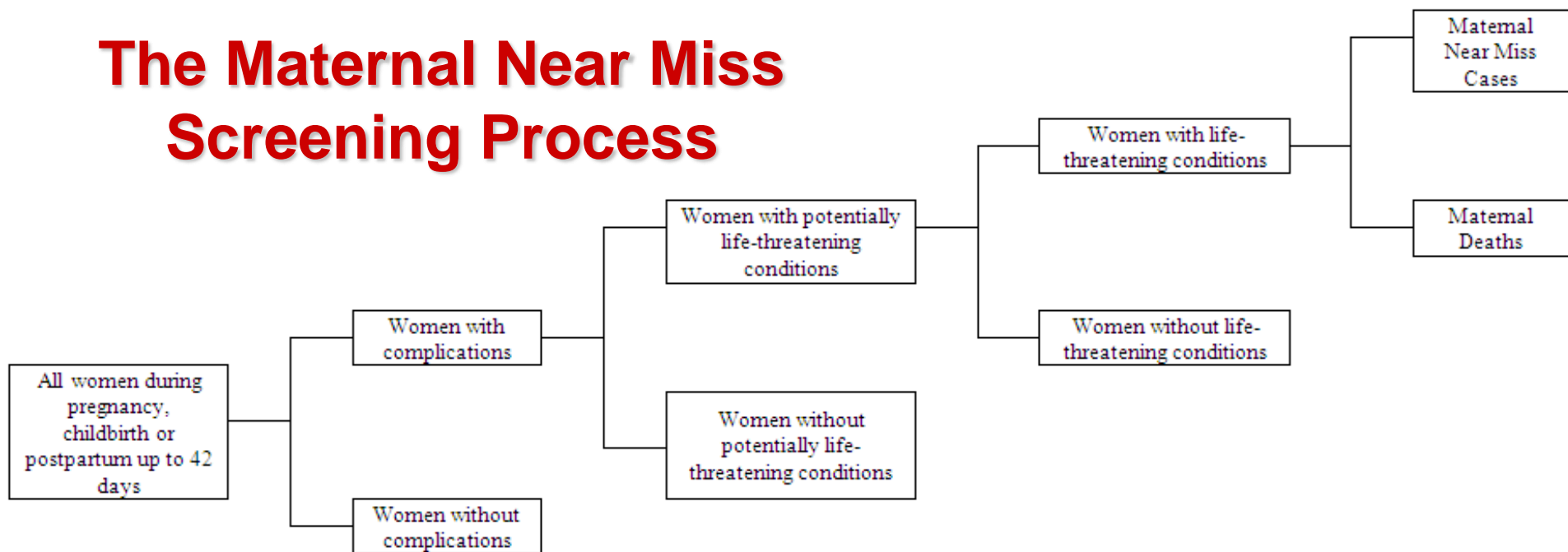


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The Maternal Near Miss Screening Process



Which indicators should be used?

- In addition to the number of maternal near miss cases, a number of indicators can be calculated.
- Such indicators are expected to facilitate comparing the situation over time and across settings.



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MATERNAL NEAR MISS INDICATORS



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Maternal Near Miss incidence ratio

Refers to the number of maternal near miss cases per 1,000 live births. [MNM IR = MNM/LB]

e.g.:

5 Maternal Deaths per 1,000 live births

45 Maternal Near Miss Cases per 1,000 live births

MNM IR= 45 per 1,000 live births



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Severe Maternal Outcome Ratio (SMOR)

Refers to the number of women with life-threatening conditions per 1,000 live births (LB).

This indicator gives an estimation of the amount of care that would be needed in an area.

$$[\text{SMOR} = (\text{MNM} + \text{MD}) / \text{LB}]$$

e.g. : SMOR= 50 SMO cases per 1,000 live births



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Maternal near miss mortality ratio

Refers to the proportion between maternal near miss cases and maternal deaths.

Higher ratios indicate better care.

[MNM : 1 MD]

e.g.: Maternal near miss mortality ratio = 9:1



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Mortality index

Refers to the number of maternal deaths divided by the number of women with life threatening conditions, expressed as a percentage.

The higher the index the more women with life-threatening conditions die (low quality of care)

The lower the index the fewer women with life-threatening conditions die (better quality of care).

$$[MI = MD/(MNM+MD)]$$

e.g. : MI= 10%



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Maternal Near Miss and the three-delay model

- First delay is related to the recognition by women and families of the need to seek care
- Second delay is related to accessing care (referral chain between facilities, and sometimes into barriers in the community—which might be physical, cultural, or financial)
- Third delay is related to receiving appropriate care in the facility.



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Maternal Near Miss and the three-delay model

- Maternal near miss cases could be classified as follows:
 - **Type A:** life threatening conditions present at hospital admission
 - **Type B:** life threatening conditions developing during hospital stay (after admission)



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Maternal Near Miss and the three-delay model

- **Type A** (life threatening conditions present at hospital admission)
 - High proportions of cases Type A could suggest first/second delay
- **Type B** (life threatening conditions develop during hospital stay/after admission)
 - The mortality index indicates intra-hospital quality of care
 - Could suggest associations with the third delay



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How to implement the maternal near miss concept?

- Routine use of the maternal near miss process for assessing obstetric care is feasible
- It requires that the collection of cases of women with life-threatening conditions are incorporated through the facilities' severe adverse events committees or other similar structures (e.g. maternal mortality review committees).



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How to implement the maternal near miss concept?

- Many hospitals in high and middle resource settings have these committees and if criteria for severe adverse events include those maternal life-threatening conditions, analysis of maternal near miss cases becomes feasible.
- In low-resource settings if this is not feasible, periodical audits can be done.



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A stepwise implementation of a multifaceted intervention

- **Step 1:** Raising awareness and persuasion to conduct routine maternal near miss reporting (opinion leaders, educational meetings, printed materials, use of the surveillance tool)
- **Step 2:** Confidential inquiries or Severe Maternal Outcome case review (audit and feedback)
- **Step 3:** Addressing identified problems, prospective surveillance of life-threatening conditions and promotion of evidence-based practices (quality of care improvement)



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Summary

- Maternal mortality is among the worst performing health indicators in resource-poor settings despite increased global attention for its reduction.
- The reduction of maternal mortality requires strengthening the capacity of local health systems capacity in providing continuous, appropriate and timely life-saving services to women with complications during pregnancy, childbirth and postpartum.



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Summary

- A substantial proportion of maternal deaths take place in hospitals
- It is crucial to understand the processes of obstetric care in order to address any identified weakness or failure within the system.
- Maternal death reviews, if implemented consistently, could provide valuable information.



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Summary

- However, although a significant public health problem, maternal deaths are still rare events in absolute terms, in particular when they are studied within an individual facility.
- Incorporating maternal near miss analysis in assessing the process of obstetric care will be a valuable contribution in taking necessary actions to improve the quality of care.



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Summary

- Moreover, countries are increasingly adopting policies that encourage births in institutions.
- Instruments must therefore, be available to assess the quality of care within the institutions.
- Routine assessments of maternal near miss cases will help answer that need.



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Summary

- The advantages are:
 - The care of critically ill women will be analysed, not only deaths. This is important given the emphasis that emergency obstetric care is currently receiving, and allows for monitoring the quality of these programmes.
 - A proportion of women with life-threatening conditions survive. They can be interviewed and areas of breakdown in the health system can be identified.
 - Indicators of maternal near miss and maternal deaths as exemplified in can allow for comparison between institutions and countries and changes over time.



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Summary

It is expected that the implementation of the maternal near miss process provide an important contribution to assessing and improving quality of obstetric care and to the reduction of maternal deaths.



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Special Programme of Research, Development
and Research Training in Human Reproduction

**During this presentation about 100
women lost their lives of causes
related to pregnancy around the world.**

**One thousand or more had severe
complications.**

Your action is required.

Thanks!



World Health Organization



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