Maternal mortality and morbidity

Maternal mortality

“Women are not dying because of diseases we cannot treat. They are dying because societies have yet to decide their lives are worth saving.

Prof. Mahmoud Fathalla

Maternal mortality

The death during pregnancy or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes[1]

The maternal mortality ratio (MMR) is defined as the number of maternal deaths during a given time period per 100 000 live births during the same time period[2]

Maternal mortality ratio in Jordan (2025) 23.7 deaths per 100,000 live births[3].

The maternal mortality ratio can be calculated directly from data collected through civil registration and vital statistics[2]

Maternal Mortality: Definitions, Trends, and Distribution

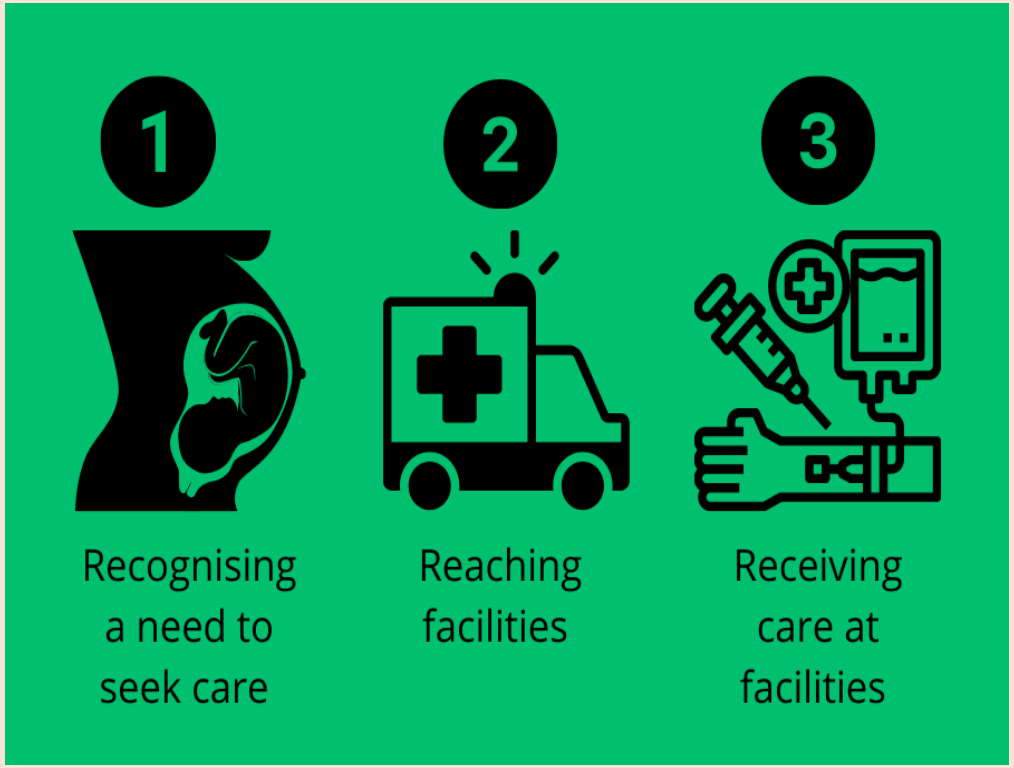
- Trends: The global Maternal Mortality Ratio (MMR) fell by 40% between 2000 and 2023.
  2000 MMR: 328 deaths per 100,000 live births.
  2023 MMR: 197 deaths per 100,000 live births.

  Inequitable Distribution:

  - Between Regions: 95% of maternal deaths occur in developing regions, with 70% in sub-Saharan Africa alone.
  - Within Countries: Stark disparities exist based on wealth and education, driven by unequal access to quality care.
  - By Age and Parity: Adolescents and women over 45 face significantly higher risks, as do women having their first or a high-numbered birth.
  - Timing: The risk of death is highest on the first and second days after birth, underscoring the critical need for professional intrapartum care.

The Three Delays Model

- Maternal mortality is not just a medical issue, but often the result of systemic delays in care.
- The paper "Too Far to Walk: Maternal Mortality in Context" by Seren Thaddeus and Deborah Maine (1994) examines the factors contributing to maternal mortality in developing countries.
- The authors present a conceptual framework called the "Three Phases of Delay," which identifies obstacles at three critical stages:



The Three Delays Model

1. Phase I Delay: Decision to Seek Care
    - Influenced by socioeconomic and cultural factors such as transportation costs, Lack of awareness about pregnancy complications., Economic and educational status.
2. Phase II Delay: Reaching a Medical Facility
    - Barriers include Uneven distribution of health facilities, Long travel distances, Lack of reliable transportation.
3. Phase III Delay: Receiving Adequate Treatment
    - Health system failures such as: Shortages of trained staff, essential drugs, and equipment (e.g., blood for transfusions).

Direct Maternal Deaths

Direct maternal deaths are those resulting from obstetric complications of pregnancy, labor, delivery, and the postpartum period.

Scale and Significance

High Burden: Direct causes account for nearly 75% of all maternal deaths worldwide annually.

Preventability: Most of these deaths are preventable with known, often basic, medical interventions.

Disproportionate Impact: 99% occur in low-resource settings, correlating with high fertility rates and poor access to quality obstetric care.

The "Big Five" Direct Causes

- Five main causes account for about 75% of all direct maternal deaths:

1. Hemorrhage (especially Postpartum Hemorrhage - PPH): Largely unpredictable, but risk is reduced by 60% with a drug (like oxytocin) to contract the womb after delivery. Management requires a skilled provider to control bleeding and access to resources like blood transfusion.
2. Abortion-Related Deaths: Caused by hemorrhage or sepsis from unsafe abortions.
3. Hypertensive Disorders (Pre-eclampsia/Eclampsia): High-quality antenatal care is critical for early detection and management
4. Sepsis (Infections): Risk factors include unclean delivery environments, poor maternal nutrition, HIV, anemia, and Caesarean sections.
5. Obstructed Labor: Can lead to uterine rupture and sepsis.

Strategies to Address Direct Deaths

1. Skilled Birth Attendance: The cornerstone intervention, defined as care by an accredited professional with necessary equipment and support systems.
2. Community Interventions: Women's groups that empower, share knowledge, and encourage health-seeking behaviors have been shown to reduce maternal mortality.
3. Health System Strengthening: Skills training for healthcare workers in emergency obstetric care.
4. Maternal Death Surveillance and Response (MDSR): A WHO-recommended cycle of identifying, reviewing, and learning from every maternal death to prevent future ones.

Indirect maternal deaths

Are those resulting from pre-existing diseases or new diseases that develop during pregnancy, which are aggravated by the physiological effects of pregnancy

Scale and Significance

Growing Proportion:

Indirect deaths account for over a quarter (27.5%) of all maternal deaths globally, and their relative importance is increasing.

The Obstetric Transition:

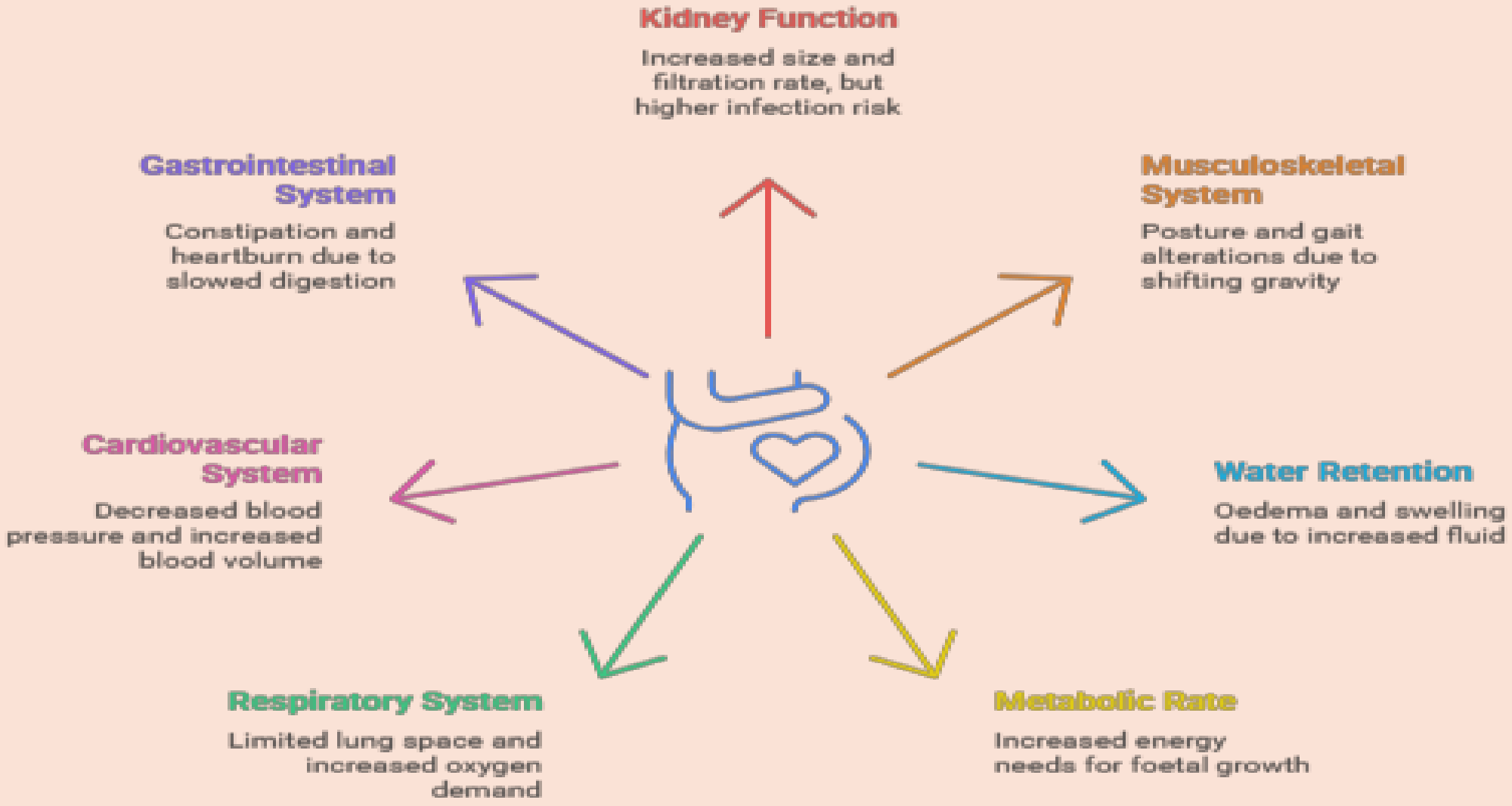
- Countries with minimal obstetric care and high fertility rates have a high maternal mortality ratio due to both direct and indirect deaths, with most indirect deaths being due to communicable diseases.
- With improved medical infrastructure and increased uptake of reproductive health services and obstetric care, fertility rates and maternal mortality fall, in particular direct deaths and indirect deaths due to communicable disease.

  When women gain access to education and family planning, they often choose to delay childbearing. As a result, they are more likely to have pre-existing health conditions by the time they become pregnant, leading to an increase in indirect maternal deaths associated with non-communicable diseases.

Why Pregnancy is a Risk Period

Pregnancy causes significant physiological changes (e.g., increased blood volume, altered immune response) that can worsen pre-existing health conditions or make women more susceptible to severe outcomes from new illnesses.

Physiological Changes in Pregnancy



Causes of Indirect Maternal Deaths

Pre-existing Medical Conditions:

Account for more than half of all indirect deaths . This impact is strongest in high-income countries (HICs).

- Cardiovascular Disease:
  - This is the leading cause of maternal mortality in High-Income Countries (HICs).
  - Its prevalence is rising due to increasing risk factors like obesity, diabetes, hypertension, and advanced maternal age, as well as more women with congenital heart disease surviving to childbearing age.
- Sickle Cell Disease:
  - Improved medical care allows more women with this genetic disease to become pregnant.
  - These are high-risk pregnancies, with maternal mortality rates 7-11 times higher than the general population.

- Communicable (Infectious) Causes

This impact is largest in Low- and Middle-Income Countries (LMICs). Pregnancy increases the risk of severe outcomes from infections.

- Influenza:
    - Pregnant women are at higher risk for severe complications and death.
    - Influenza vaccination is now recommended for pregnant women.
- HIV/AIDS:
    - A leading cause of communicable maternal death.
    - The burden is concentrated in sub-Saharan Africa, where it accounts for over 10% of maternal deaths in several countries
- Malaria:
    - Pregnant women are three times more likely to develop severe disease.
    - It is a significant contributor to indirect maternal mortality, with rates that fluctuate with seasonal and annual transmission patterns

Important Categories Often Overlooked

- Late Maternal Deaths: Occur between 43 days and one year after the end of pregnancy. Often due to indirect causes (e.g., heart disease, diabetes) and are excluded from most MMR calculations, leading to underestimation of the problem.
- Coincidental Deaths: Deaths from accidents, homicide, or cancers not aggravated by pregnancy. While not classified as maternal deaths, they are a significant cause of mortality for pregnant and postpartum women.

Challenges

- Data Gaps: Indirect deaths are poorly documented. Underlying conditions may be missed.
- Historical Focus: Global strategies have primarily targeted direct deaths, leaving a gap in understanding and addressing indirect causes.
- Health System Weakness: Preventing indirect deaths requires robust primary care and health systems to manage chronic conditions, which are often weak in low-resource settings.

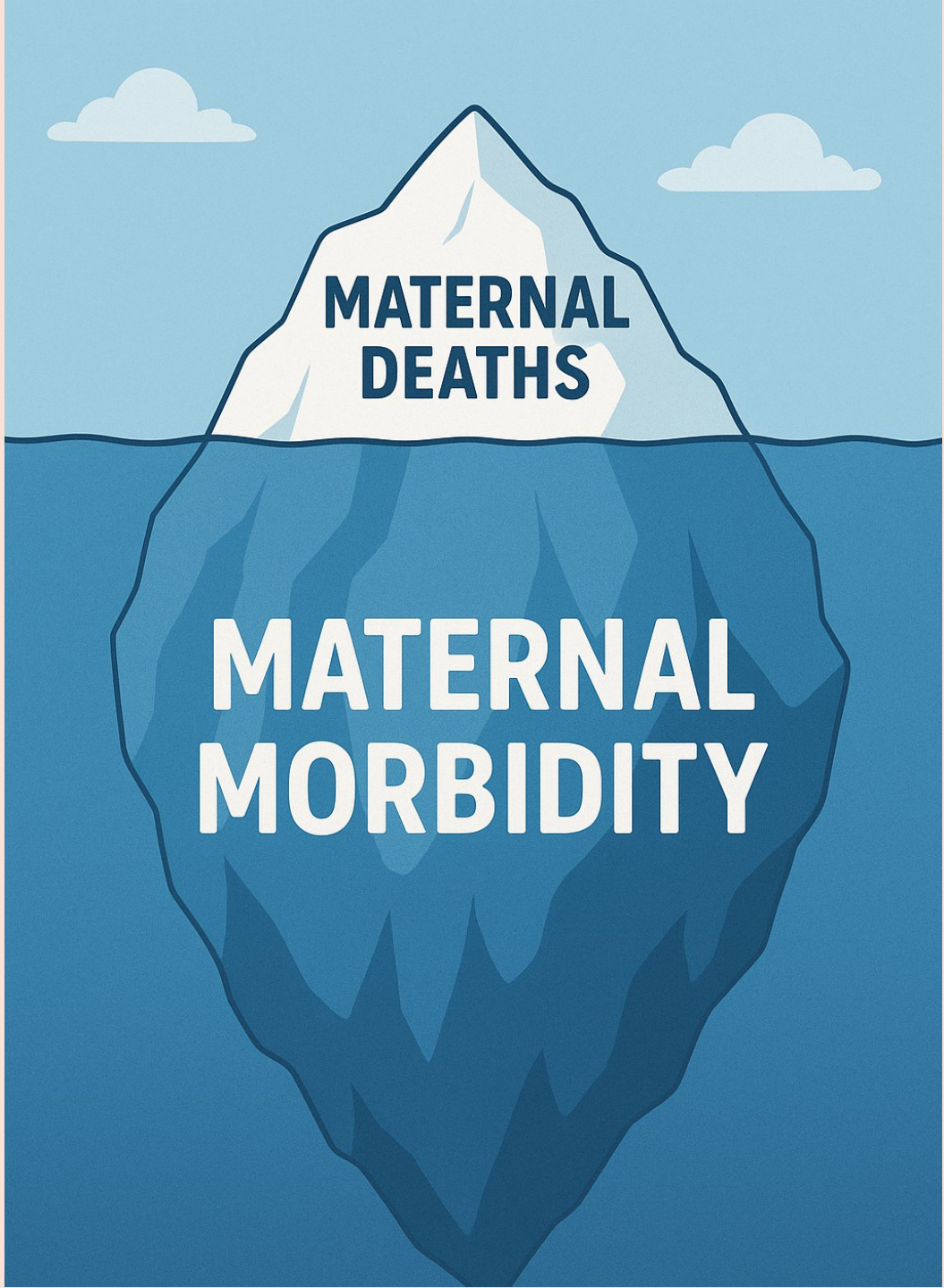
Future priorities to address indirect deaths include:

- Comprehensive Approach: Move beyond a narrow focus on childbirth to address the entire reproductive lifecourse (preconception, pregnancy, postnatal) and the broader social determinants of health (poverty, education).
- Strengthening Health Systems: Invest in primary care, skilled health workers, equipment, and infrastructure to provide high-quality, respectful care for all conditions.
- Preconception Care: Identify women with high-risk conditions and optimize their health before pregnancy.
- Empowerment and Education: Empower women through education to take control of their reproductive health.
- Targeted Research: Conduct more research on the "harder-to-reach" cases and on the specific causes and solutions for indirect maternal deaths.

Maternal Morbidity

The "Iceberg" of Maternal Health

Concept: Maternal deaths represent only the "tip of the iceberg" of the overall burden of poor maternal health. Beneath the surface lies a much larger issue: maternal morbidity—ill health related to pregnancy and childbirth.



Maternal Morbidity

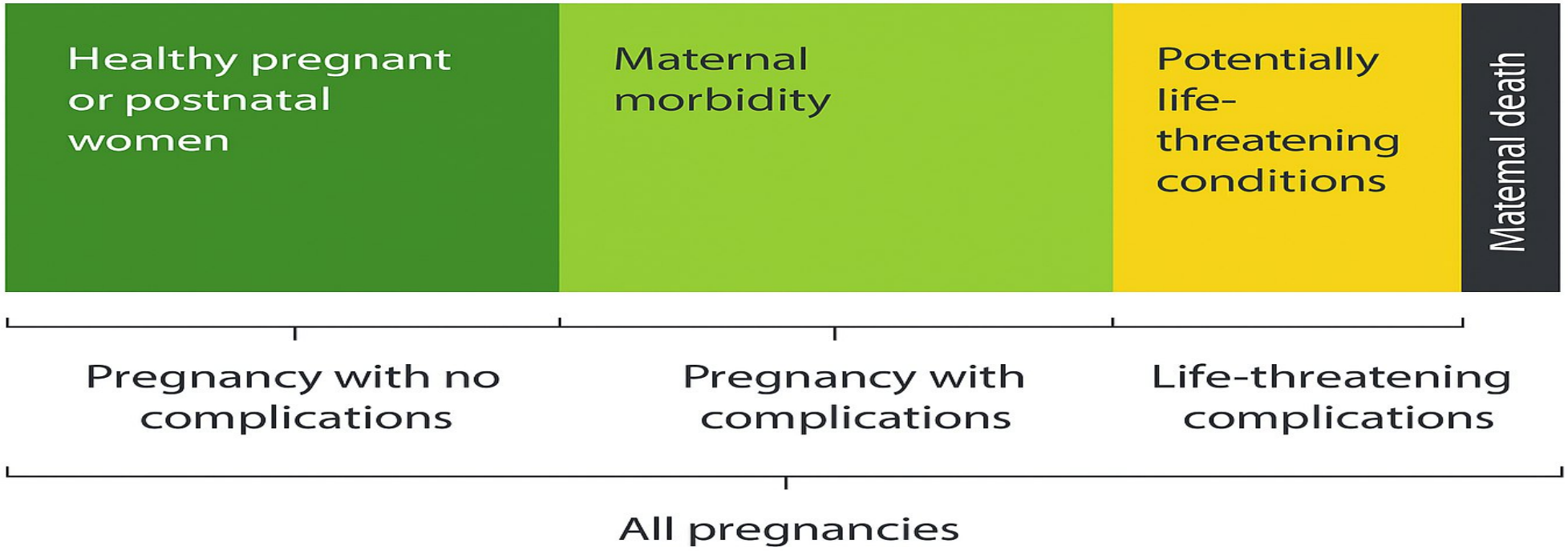
Scale: It is estimated that annually, up to 10% of pregnant women worldwide, or twenty million women, experience pregnancy-related morbidity. For every woman who dies, an estimated 20-30 more suffer complications, disability, and ill health.

The Continuum: There is assumed to be a continuum from health

minor morbidity severe (life-threatening) morbidity

maternal death. However, the exact proportions of women at each stage are unclear.

continuum from maternal health to maternal death[1]



Defining and Categorizing Maternal Morbidity

Broad Definition:

Maternal morbidity is defined as "any condition that is attributed to, or aggravated by, pregnancy or childbirth which has a negative impact on the woman's wellbeing and/or functioning."

- Two Key Categories:
  1. Severe Acute Maternal Morbidity (SAMM) / Maternal Near Miss (MNM): A woman who nearly died but survived a severe complication during pregnancy, childbirth, or within 42 days of its end. This is well-defined and measured in higher-level healthcare settings to investigate care deficiencies.

  2. Non-Life-Threatening Maternal Morbidity: Conditions like mild anemia, urinary incontinence, or abnormal bleeding that are not immediately life-threatening but negatively impact a woman's wellbeing. This area is largely neglected, poorly documented, and lacks global standard indicators for measurement.

The Expanding Scope: Holistic Health

- The understanding of maternal health is expanding beyond physical survival to include psychological and social wellbeing. This encompasses issues like:
  - Perinatal depression
  - Suicidal ideation
  - Domestic violence
  - Substance misuse
- Global targets, like the Global Strategy for Women's, Children's, and Adolescents' Health (2016-2030), now emphasize the right for all women to not only survive but to thrive and achieve the highest standard of physical, mental, and social health.

Causes of Maternal Morbidity

1. Normal Physiological Changes: Common issues like nausea/ vomiting (very common and known as morning sickness), heartburn, constipation, and backache.
2. Communicable Causes:
    1. Infections: Urinary Tract Infections (UTIs) are the most common. Others include chorio-amnionitis, endometritis, and mastitis.
    2. Geographic Infections: Prevalence of HIV, malaria, tuberculosis, syphilis, and Ebola varies greatly but is highest in sub-Saharan Africa.

Causes of Maternal Morbidity

3. Non-Communicable Causes (NCDs):

Anemia, Pre-existing hypertension, asthma, and gestational diabetes.

4. Obstetric Complications: A wide range including:

- hypertensive disorders, hemorrhage, intrauterine growth restriction, preterm labor and birth, malpresentation, multiple pregnancy, obstructed labor, complications of Caesarean section.
- Current prevalence data largely come from high-income countries and may not reflect rates in low- and middle-income countries.
- Many maternal morbidities are under-recognized and inadequately screened during antenatal and postnatal care, leading to preventable illness and disability.

Key Challenges

- Measurement Difficulties: Particularly in LMICs, due to poor health infrastructure, limited record-keeping, and a lack of routine data collection.
- Non-Life-Threatening Morbidity: Conditions that are not acute are rarely documented, especially in rural areas, as women may not present to health services, yet their quality of life is severely impacted.
- Lack of Standard Tools: There is no internationally accepted, holistic methodology to measure maternal morbidity.
- Delayed Manifestation: The consequences of morbidity can appear months or years after pregnancy, making data collection difficult.