Methodological issues in the measurement of maternal mortality and morbidity

Why is it important to monitor maternal mortality and morbidity?

- What women die of
- Priorization
- Evaluation of progress

Why is it difficult to measure maternal mortality

- ✓ Rare event
- ✓ Lack of vital statistics
- ✓ Attribution of cause is not reliable
  - ➔ underestimates
- ✓ Differentials in definitions
- ✓ Differentials in interpretation

Published and revised MMR

Salabane B. IJE, 1999;28:64-69

Per 100 000 Live births	Published rates	Revised rates	*P*-values[a]
Austria	5.7	9.4	0.002
Bavaria (G)	8.6	7.6	0.157
Denmark	7.4	9.8	0.083
Finland	6.9	9.9	0.083
Flanders (BE)	4.7	4.7	-
France	11.7	11.3	0.157
Hungary	7.5[b]	11.9	0.004
The Netherlands	7.7	7.4	0.655
Norway	1.7	3.3	0.317
Portugal	7.6	9.0	0.157
UK	5.6	6.9	0.021
All countries	7.7	8.7	<0.001

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Differentials in definitions

UK — Ectopic pregnancy, Abortion → **Early pregnancy deaths**

USA — Ectopic pregnancy → **Haemorrhage**

USA — Septic abortion → **Sepsis**

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Maternal death
ICD-10

"A maternal death is the death of a women while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes"

Indicators to measure maternal mortality

- ✓ Maternal mortality ratio (MMR)
- ✓ Maternal mortality rate (MMRate)
- ✓ Proportion of deaths women of reproductive age that are due to maternal causes (PMDF)
- ✓ Maternal Lifetime Risk (LTR)

MMR

$$\text{MMR} = \frac{\text{no. of maternal deaths}}{\text{no. of live births}} * 100{,}000$$

MMRate

$$\text{MMRate} = \frac{\text{no. of maternal deaths}}{\text{no. of women aged } 15-49} * 100{,}000$$

PMDF

$$PMDF = \frac{\text{no. of maternal deaths}}{\text{no. of deaths of women aged } 15-49} * 100$$

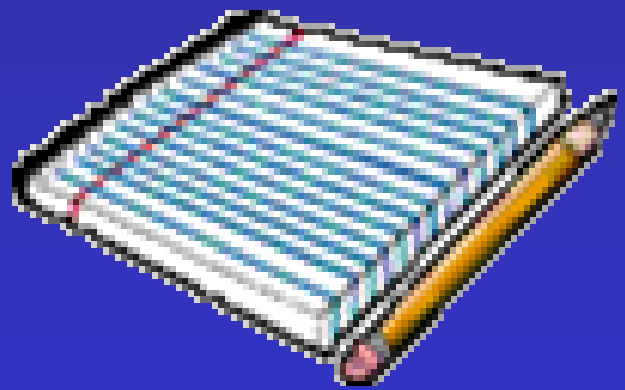
Maternal Life Time Risk

$$LTR = 35 * MMRate$$

How do we measure maternal mortality?

Maternal mortality

Direct counting



Special surveys

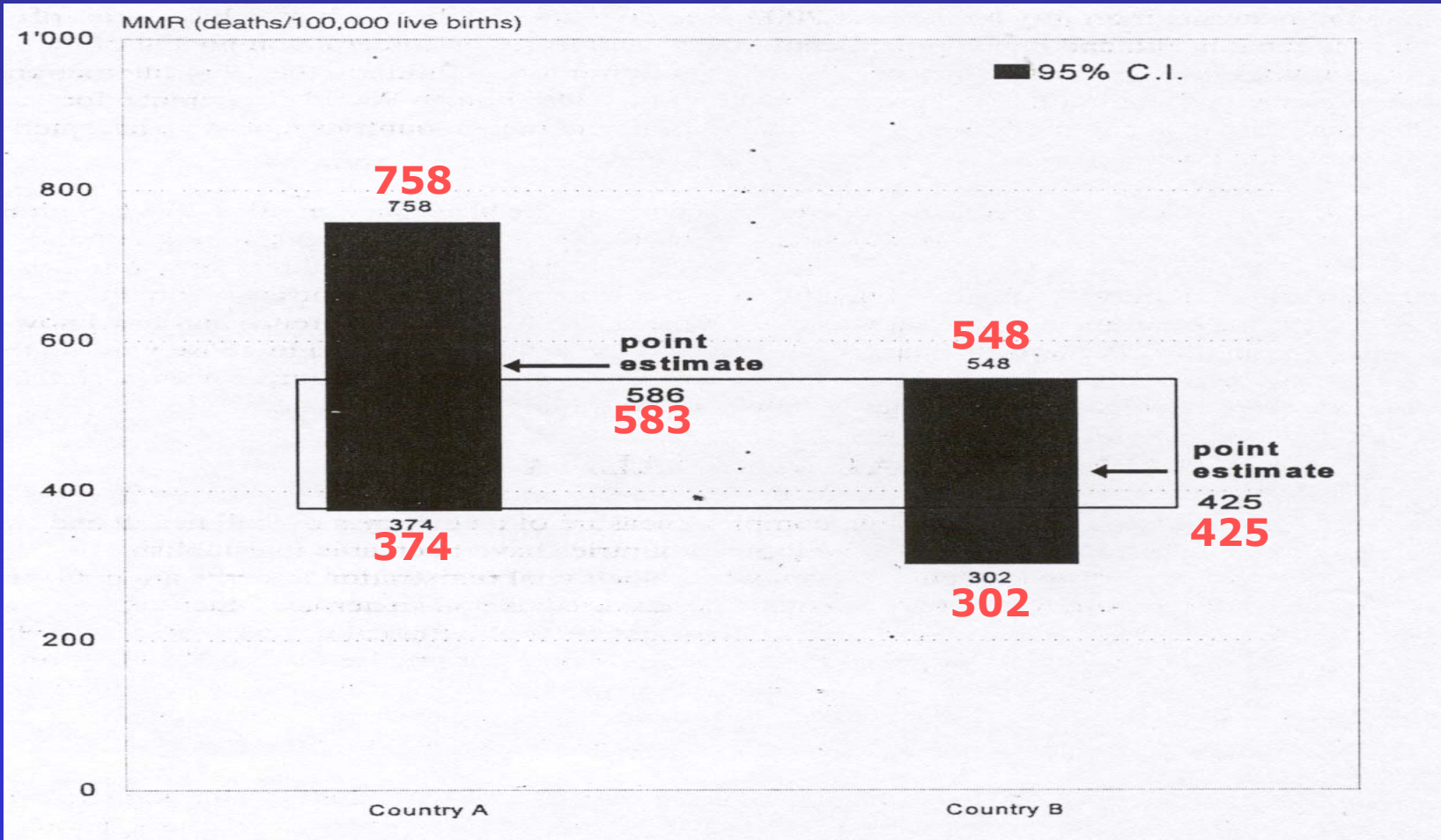
Direct counting

- ✓ Vital registration systems
- ✓ Hospital records
- ✓ Census

Special surveys

- ✓ Reproductive Age Mortality Studies (RAMOS)
- ✓ Direct household survey methods
- ✓ Direct/Indirect sisterhood methods

MMR using direct household survey: What do the estimate really mean?



Special surveys

- ✓ Reproductive Age Mortality Studies (RAMOS)
- ✓ Direct household survey methods
- ✓ Direct/Indirect sisterhood methods

Sisterhood methods

- ✓ Reduces sample sizes
- ✓ Estimates 10-13 years previous to the survey
- ✓ They measure pregnancy-related deaths
- ✓ No useful for monitoring changes

Techniques to ascertain cause of death

- ✓ Verbal autopsia
- ✓ Confidential enquiry

Problems?

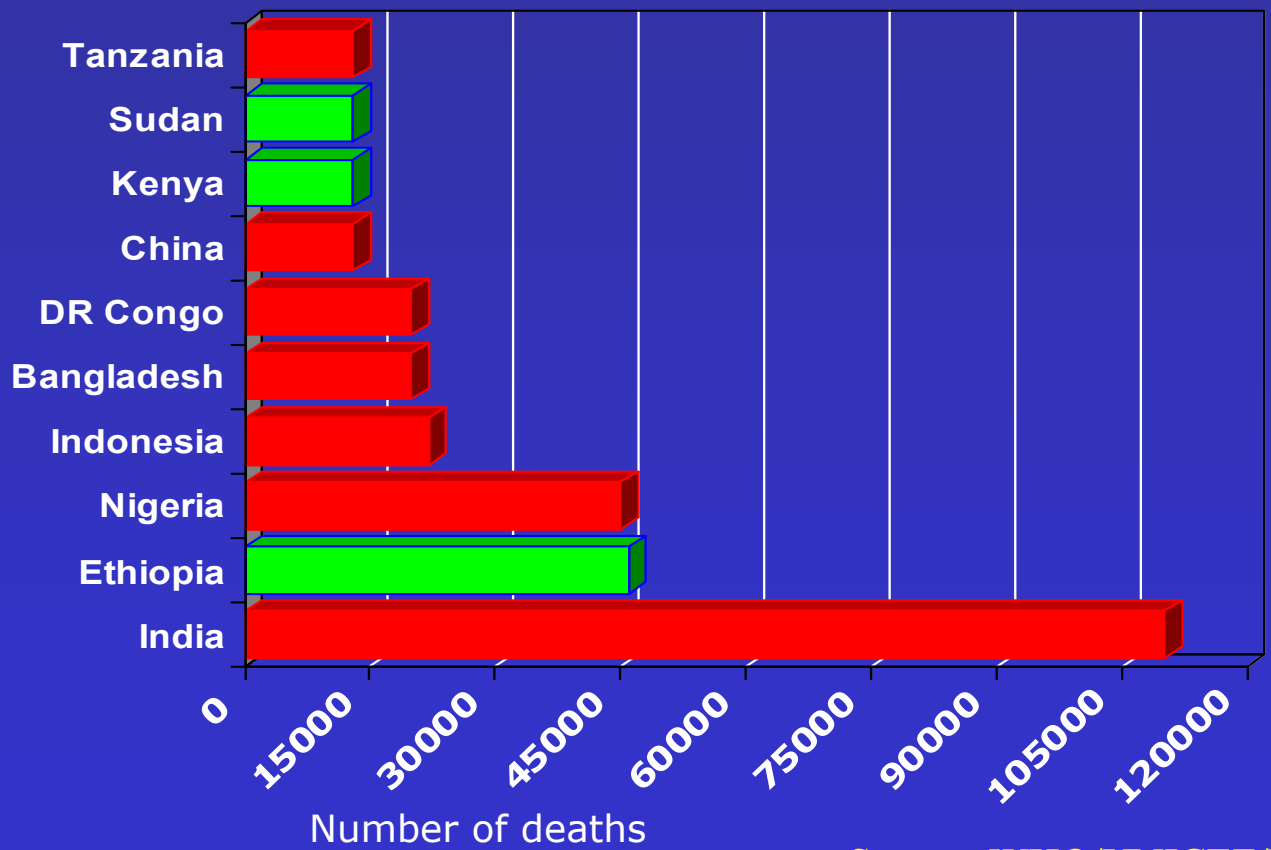
- ✓ Different methodologies
- ✓ Precision - confidence intervals
- ✓ Timing of availability of data

Maternal mortality estimates 1995

Region	MMRatio (maternal deaths per 100,000 live births)	Number of maternal deaths	Lifetime risk of maternal death, 1 in:
World total	400	515,000	75
More developed countries	21	2,800	2,500
Less developed countries	440	512,000	60
Least developed countries	1,000	230,000	16

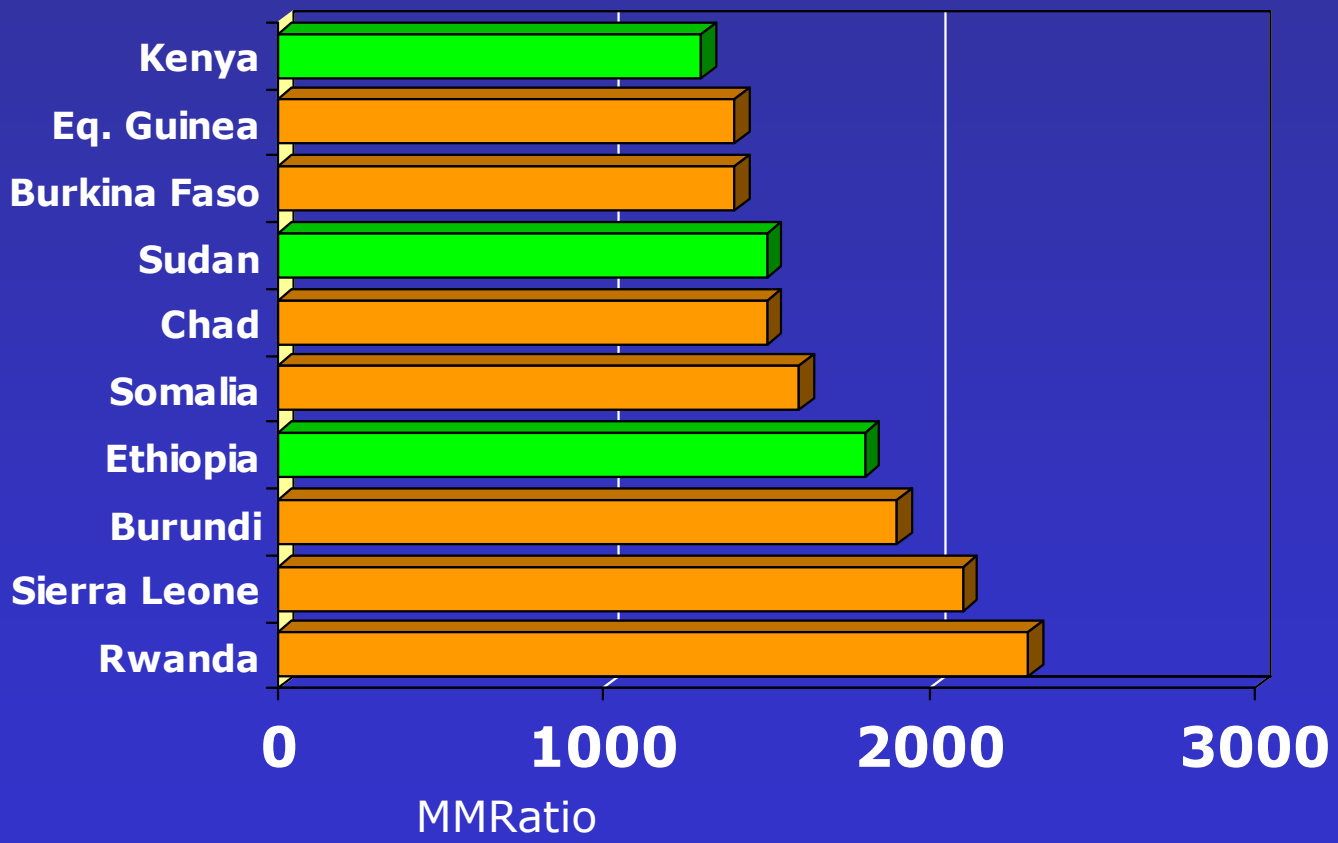
Source: WHO/UNICEF/UNFPA, 2001

Priority:
61% of all maternal deaths occur in 10 countries



Source: WHO/UNICEF/UNFPA, 2001

Priority:
Countries with highest MMRatios



Source: WHO/UNICEF/UNFPA, 2001

Difficulty in monitoring trends

Country	1990 Deaths	1990 MMRatio	1995 Deaths	1995 MMRatio
India	147,000 *	570	110,000 ***	440
Ethiopia	33,000 *	1400	46,000 *	1800
Indonesia	31,000 *	650	22,000 **	470
Bangladesh	33,000 *	850	20,000 *	600
Dem Rep of Congo	16,000 *	870	20,000 *	940
China	22,000 ***	95	13,000 ***	60

Legend: *** RAMOS
** Sisterhood
* Model

Source: WHO/UNICEF/UNFPA, 2001

Measuring maternal morbidity

- ✓ Hospital-based
- ✓ Community-based

Hospital-based

- ✓ Not all women use hospitals
- ✓ Assuming diagnostic correct
- ✓ Assuming completeness of records

Community-based

- ✓ Interview surveys
- ✓ Clinical examinations
- ✓ Laboratory measurements

Differentials in definitions

- ✓ Haemorrhage
- ✓ Pre-eclampsia/eclampsia
- ✓ Abortion