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Methodological issues in the measurement of maternal mortality and morbidity



Why is it important to monitor maternal mortality and morbidity?

- ✓ What women die of
- ✓ Priority setting
- ✓ Evaluation of progress

Why is it difficult to measure maternal mortality?

It requires info about three components:

Conceptual reasons

- ✓ Deaths among WRA
- ✓ Pregnancy status at or near the time of death
- ✓ Medical cause of death

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

Practical reasons

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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Practical reasons

Differentials in definitions



UK

Ectopic pregnancy
Abortion



**Early pregnancy
deaths**

USA

Ectopic pregnancy



Haemorrhage

USA

Septic abortion



Sepsis

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Practical reasons

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”

Maternal mortality: only 42 days?



- ✓ Late maternal death: ICD-10
- ✓ Modern medical care delays maternal death
- ✓ Focus on postpartum care

Indicators of maternal mortality:



- ✓ Number of maternal deaths

USA		660
Bangladesh		16 000

Indicators of maternal mortality:



- ✓ Number of maternal deaths
- ✓ Maternal mortality Ratio (MMR)

$$\text{MMR} = \frac{\text{No. maternal deaths}}{\text{No. live births}}$$

Indicators of maternal mortality:



- ✓ Number of maternal deaths
- ✓ Maternal mortality Ratio (MMR)
- ✓ Maternal mortality Rate (MMRate)

$$\text{MMRate} = \frac{\text{No. maternal deaths}}{\text{No. women 15-49}}$$

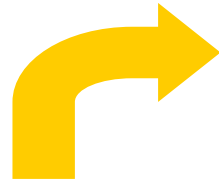
Indicators of maternal mortality:



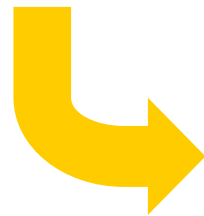
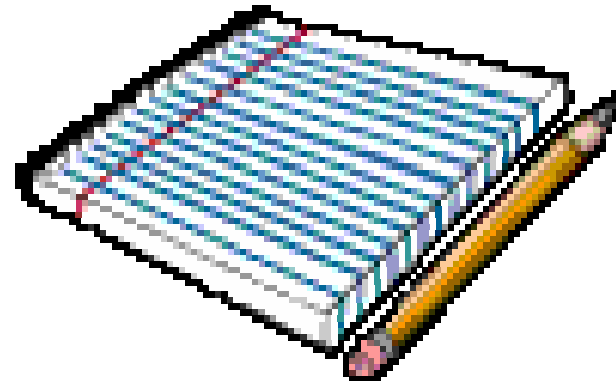
- ✓ Number of maternal deaths
- ✓ Maternal mortality Ratio (MMR)
- ✓ Maternal mortality Rate (MMRate)
- ✓ Lifetime risk of death (LTR)

$$\text{LTR} = 35 * \text{MMRate}$$

How do we measure maternal mortality?



Direct counting



Special surveys

Maternal mortality

Direct counting



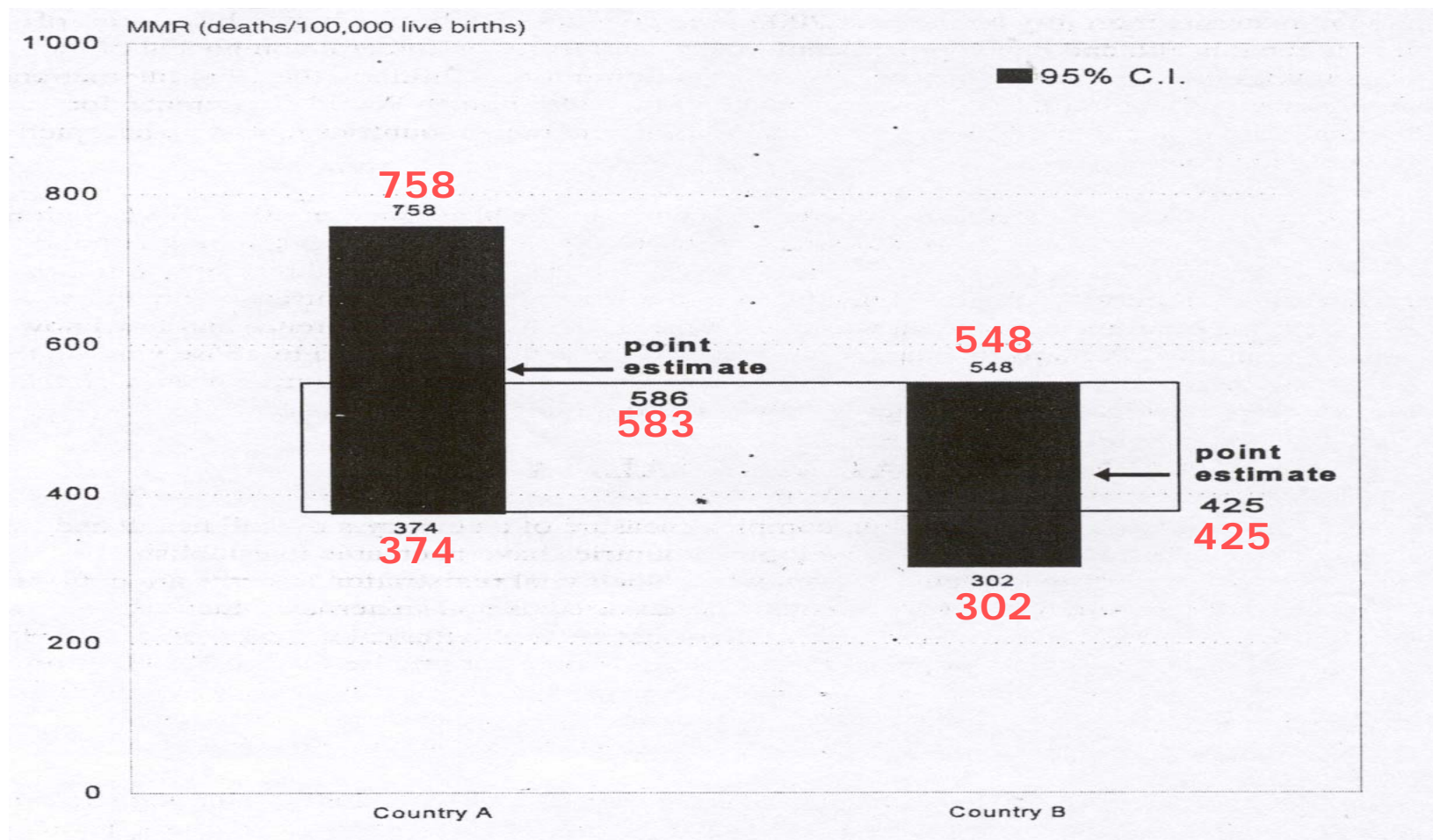
- ✓ Vital registration systems
- ✓ Hospital records
- ✓ Census

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



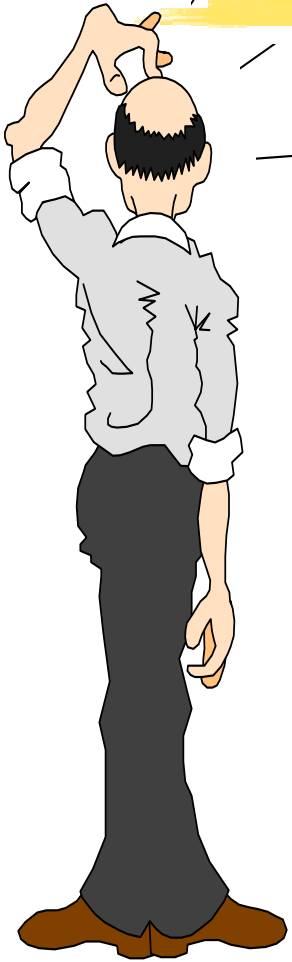
- ✓ Reduces sample sizes
- ✓ Estimates 10-13 years previous to the survey
- ✓ They measure pregnancy-related deaths
- ✓ No useful for monitoring changes

Techniques to ascertain cause of death

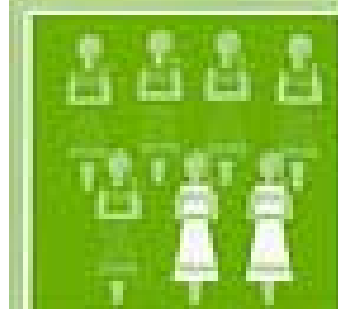
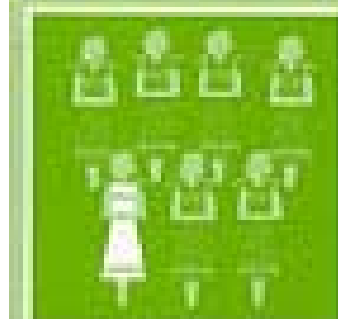
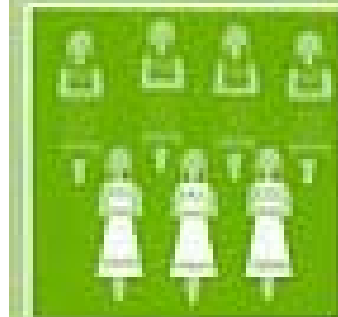


- ✓ Verbal autopsy
- ✓ Confidential enquiry

Problems?



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



Maternal Mortality In 1995:

Estimates developed by
WHO, UNICEF, UNFPA



World Health Organization, Geneva
44, Avenue Appia, CH-1224, Switzerland



United Nations Children's Fund



United Nations Population Fund

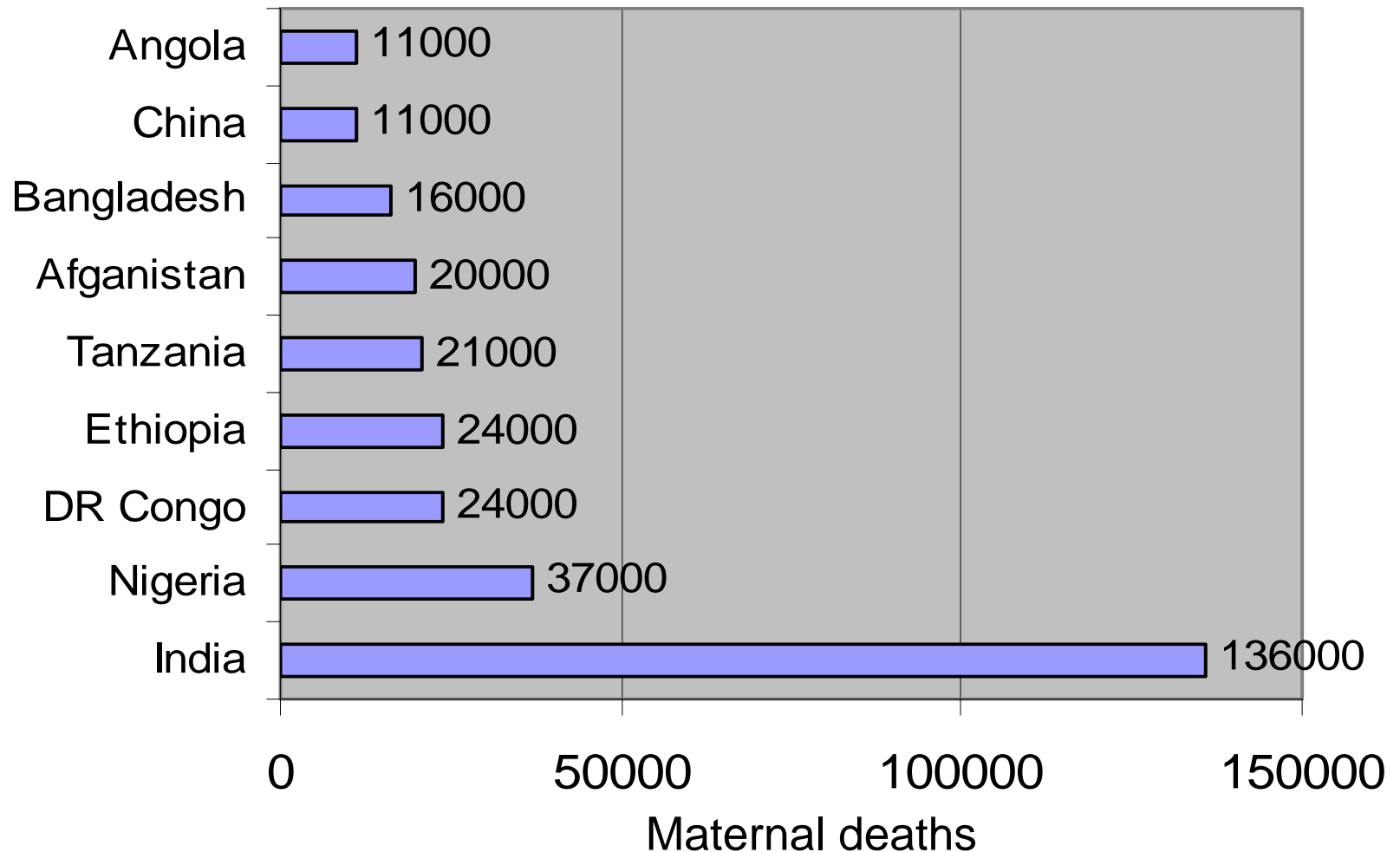
Maternal mortality estimates 2000

Region	MMRatio (maternal deaths per 100,000 live births)	Number of maternal deaths	Lifetime risk of maternal death, 1 in:
<i>World total</i>	400	529,000	74
<i>More developed countries</i>	20	2,500	2,800
<i>Less developed countries</i>	440	527,000	61
<i>Least developed countries</i>	1,000	230,000	16



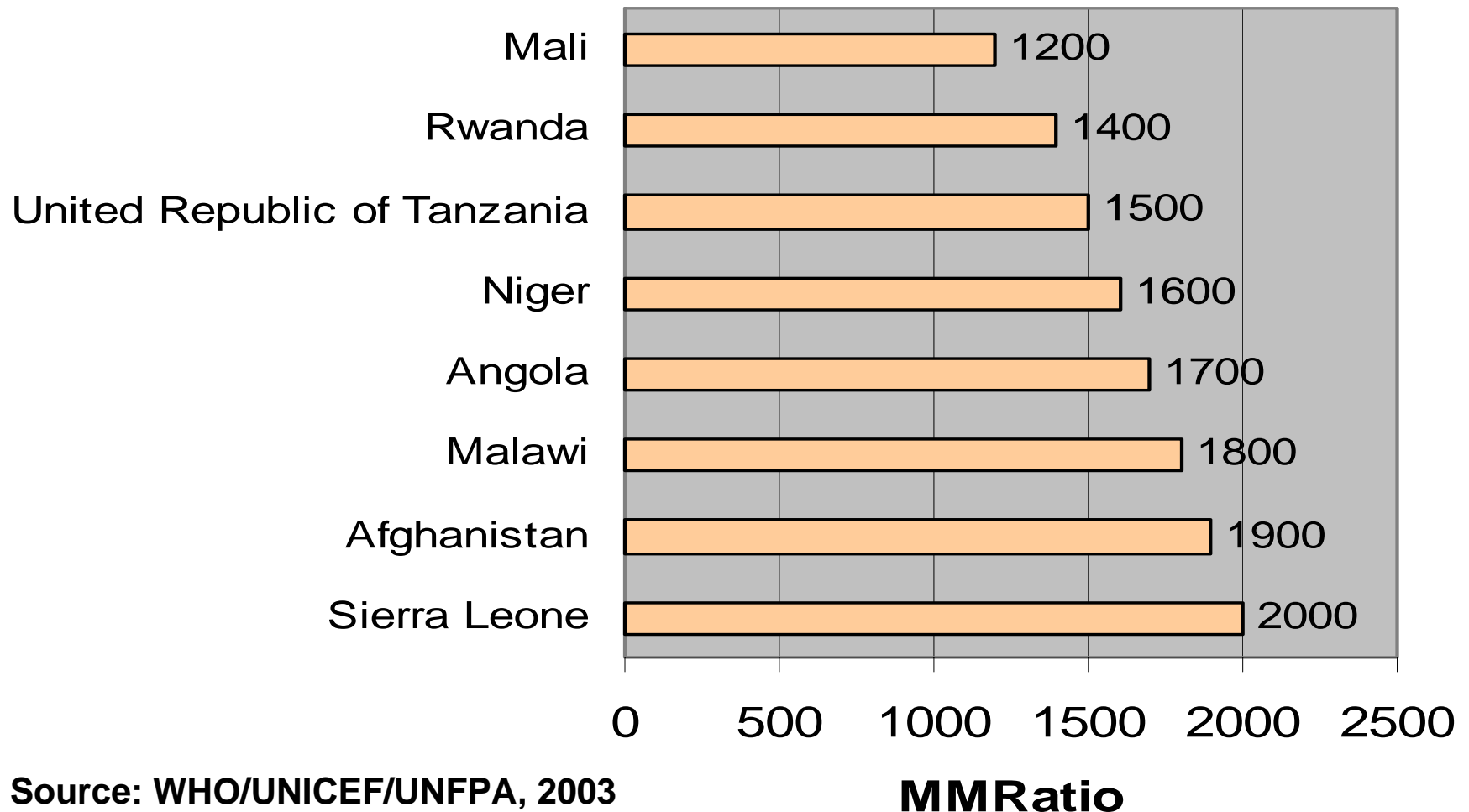
Source: WHO/UNICEF/UNFPA, 2001

Priority: ~60% of all maternal deaths



Source: WHO/UNICEF/UNFPA, 2003

Priority: Countries with highest MMRatios



Difficulty in monitoring trends

Country	1990		1995	
	Deaths	MMRatio	Deaths	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

*** 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