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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?

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- ⌘ 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

<b>Per 100 000 Live births</b>	<b>Published rates</b>	<b>Revised rates</b>	<b>P- values<sup>a</sup></b>
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 <sup>b</sup>	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
<b>All countries</b>	<b>7.7</b>	<b>8.7</b>	<b>&lt;0.001</b>

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# Differentials in definitions

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**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”



# 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

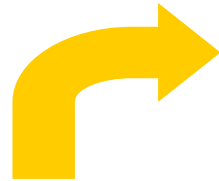
⌘ Maternal mortality Ratio (MMR)

⌘ Maternal mortality Rate (MMRate)

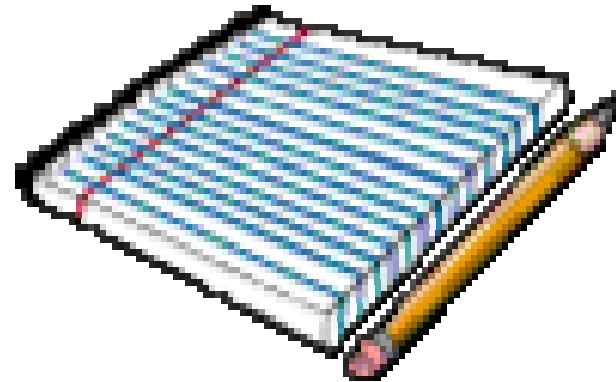
⌘ Lifetime risk of death (LTR)

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

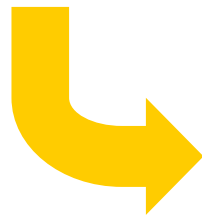
# How do we measure maternal mortality?



Direct counting



Maternal mortality



Special surveys

# Direct counting



- ⌘ Vital registration systems
- ⌘ Hospital records
- ⌘ Census

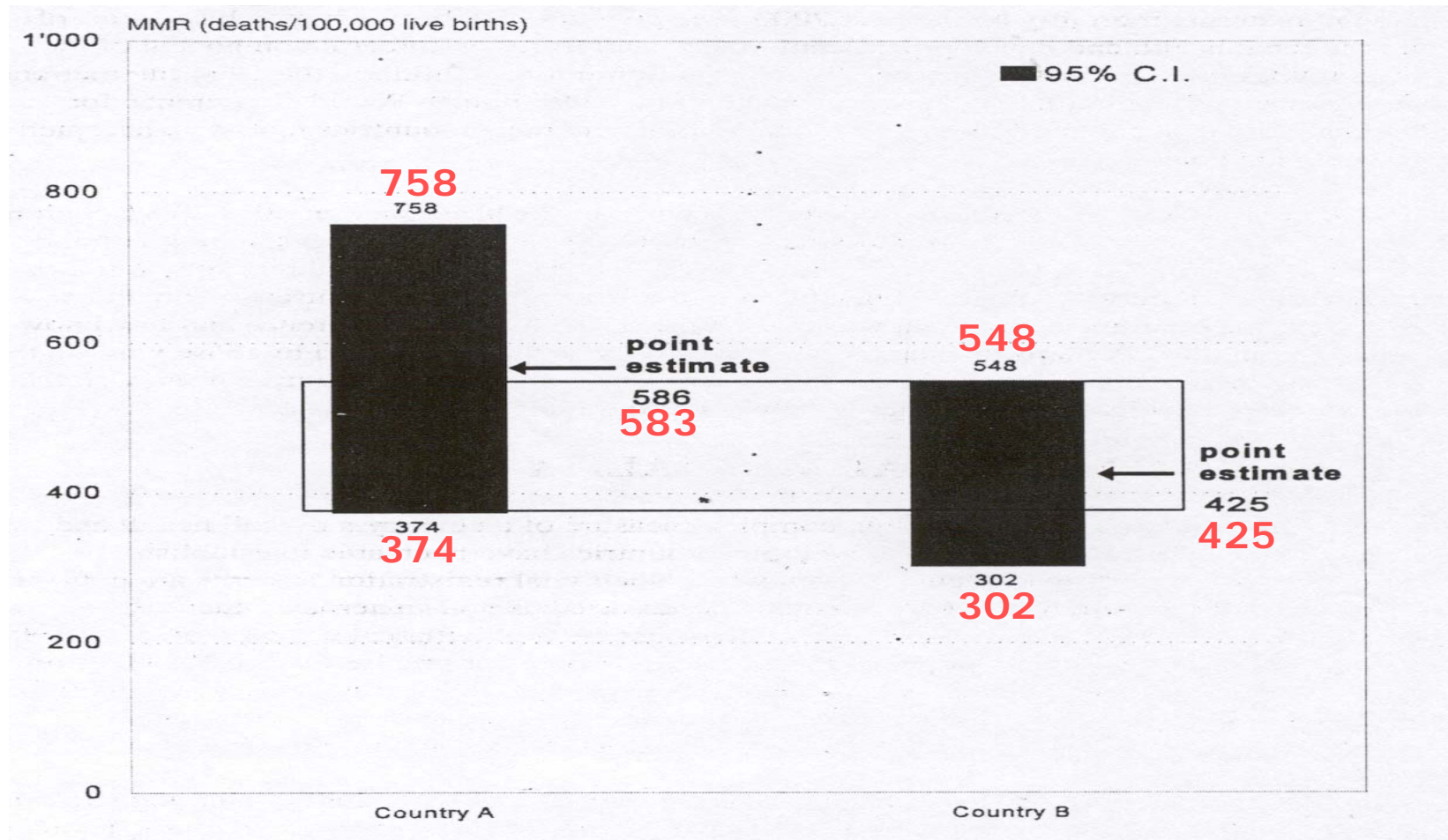
# Special surveys



- ⌘ 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

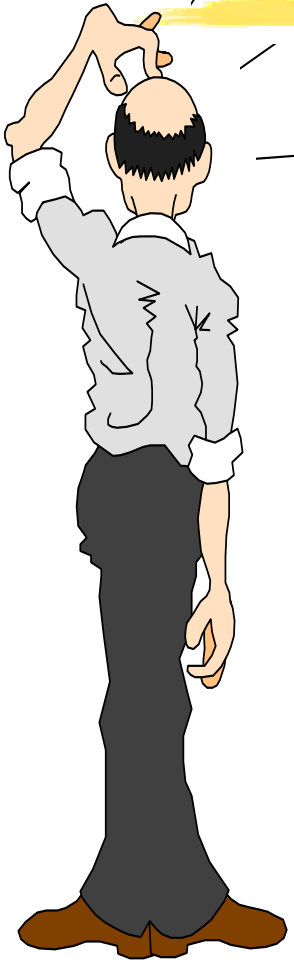
# Techniques to ascertain cause of death



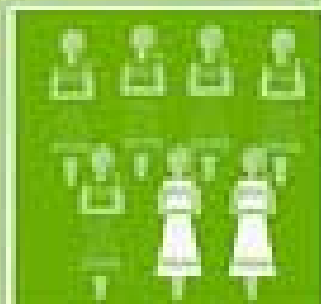
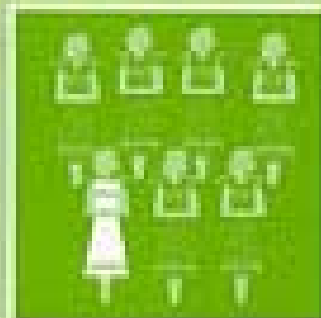
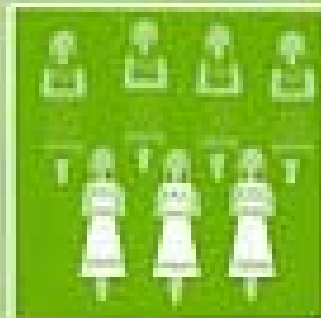
⌘ Verbal autopsy

⌘ 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-1202, Geneva



United Nations Children's Fund



United Nations Population Fund

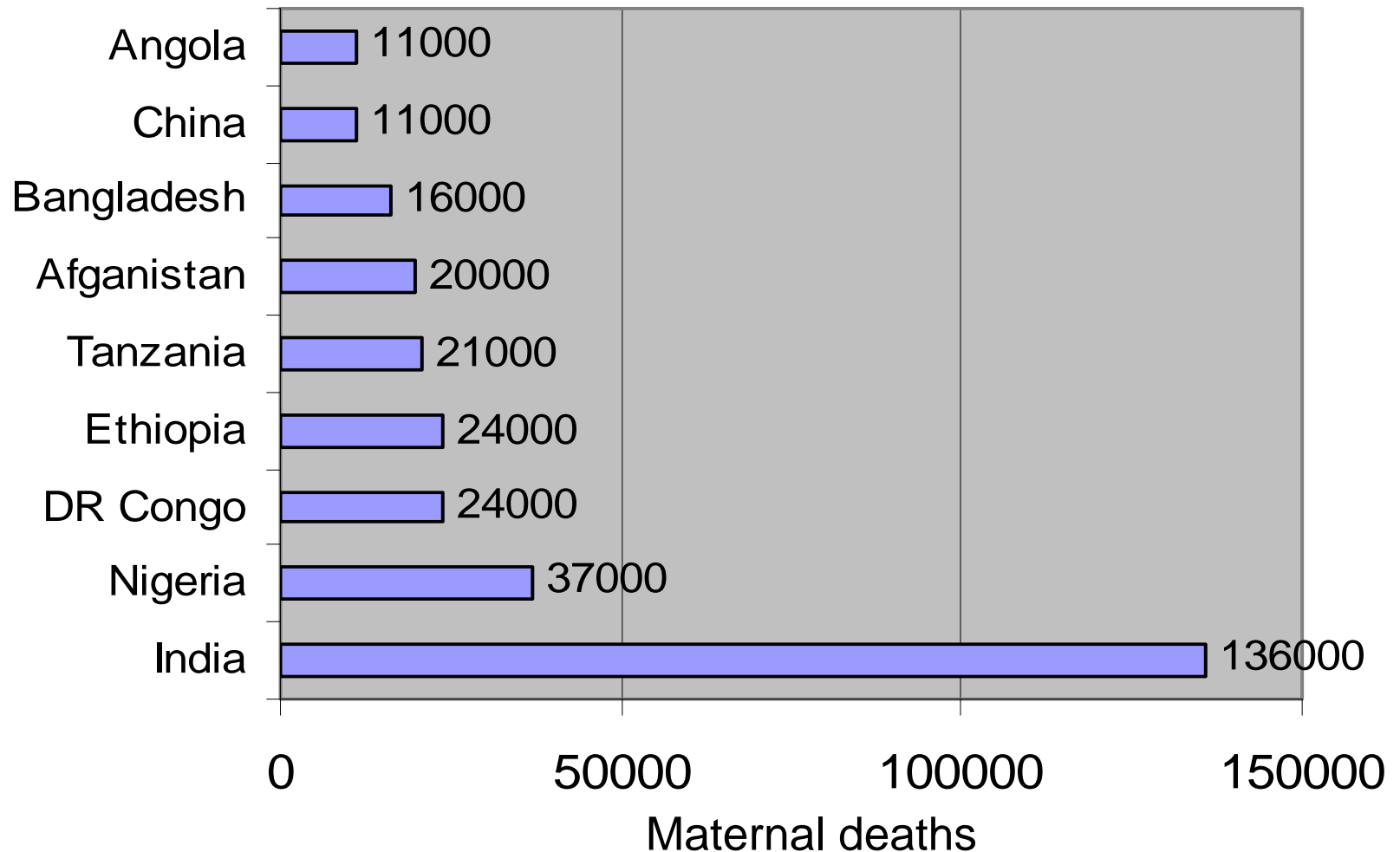
# Maternal mortality estimates 2000

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

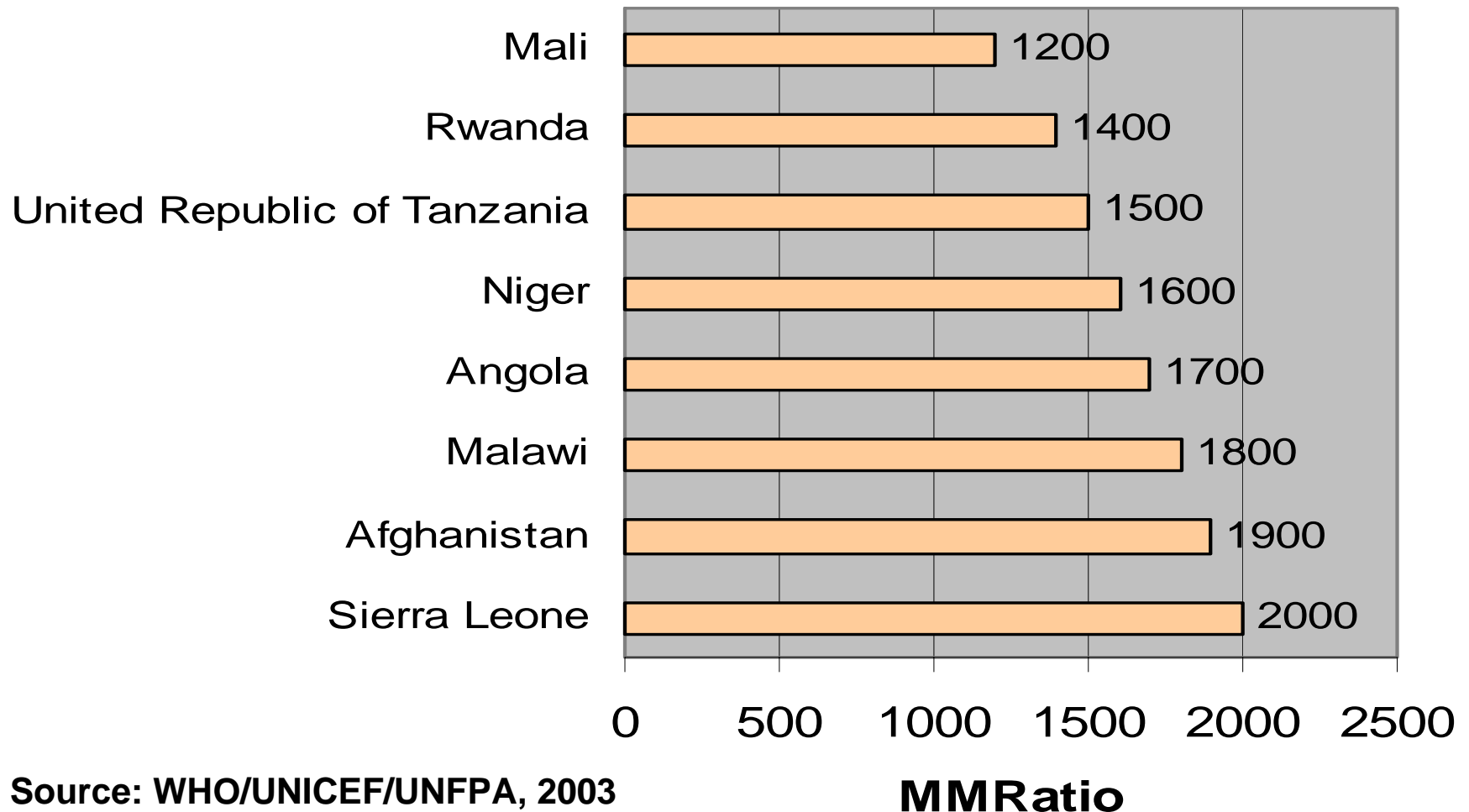
# Priority: ~60% of all maternal deaths



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

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- ✓ 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