Dr Ana Pilar Betrán
Department of Reproductive Health and Research
World Health Organization

Methodological issues in the measurement of maternal mortality and morbidity

Training Course in Sexual and Reproductive Health Research
Geneva, February 2009


"...it's not because countries are poor
that they cannot afford good health information.
It's because they are poor that they cannot
afford to be without it."

Why is it important to monitor maternal mortality and morbidity?

- ✓ What women die of
- ✓ Priority setting
- ✓ Evaluation of programmes' progress
- ✓ Preventable deaths that tell us more about the country

MDGs

Goal 5: *Improve maternal health*

Target: Reduce the MMR

by three-quarters,

between 1990 and 2015

Indicators: MMR, SBA

Why is it difficult to measure maternal mortality?

Conceptual reasons

It requires info about three components:

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

Why is it difficult to measure maternal mortality?

Practical reasons

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

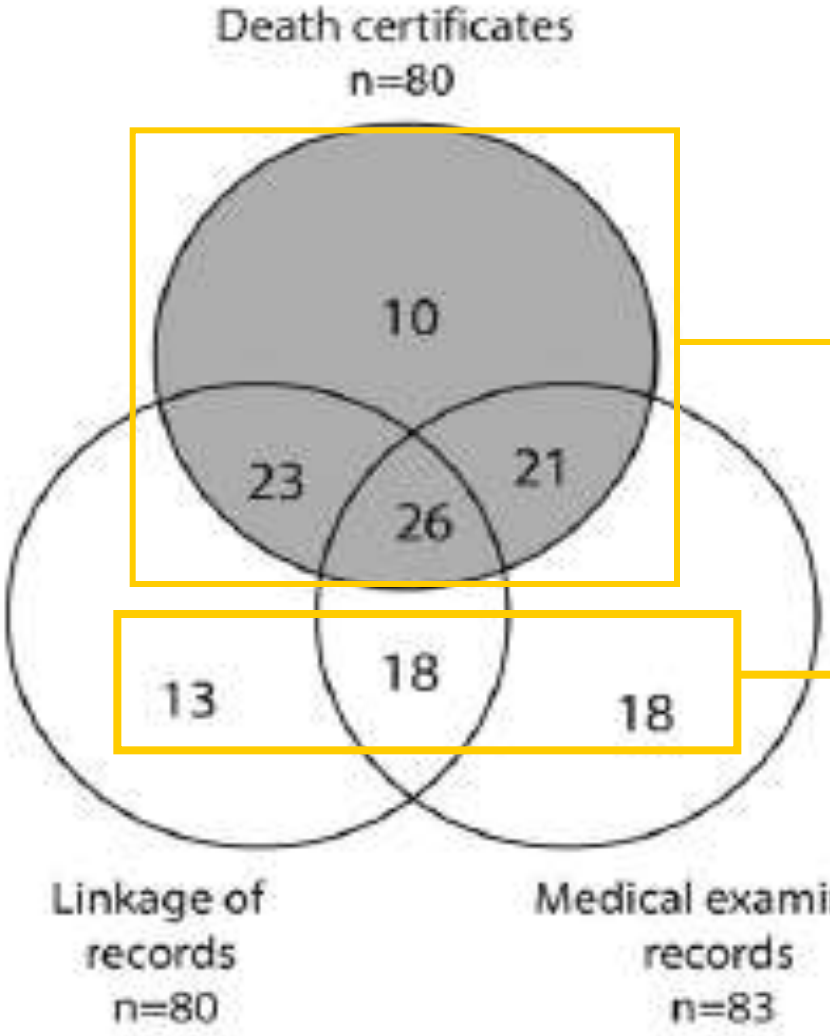
Published and revised MMR

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**

Underreporting of maternal deaths

Horon IF. AJPH, 2005;95:478-482



Total deaths: 129

80 capture by death certificates

40% underreporting

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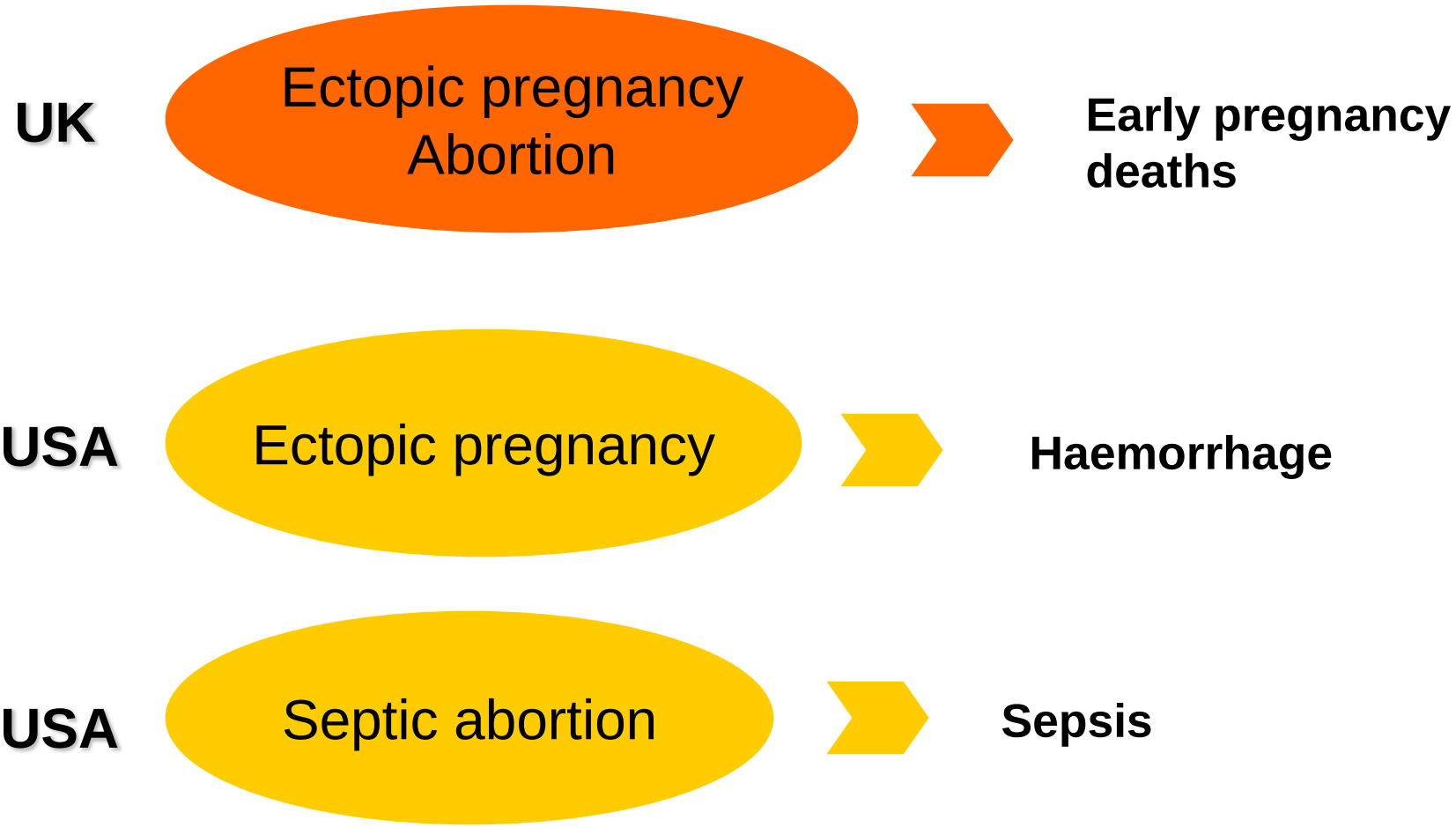
Differentials in definitions



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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

Source: Høj L et al. BJOG 2003;110:995-1000

Indicators of maternal mortality:

- ✓ Number of maternal deaths

USA	→	440
Bangladesh	→	21 000

Source: WHO/UNICEF/UNFPA/The World Bank, 2007

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:

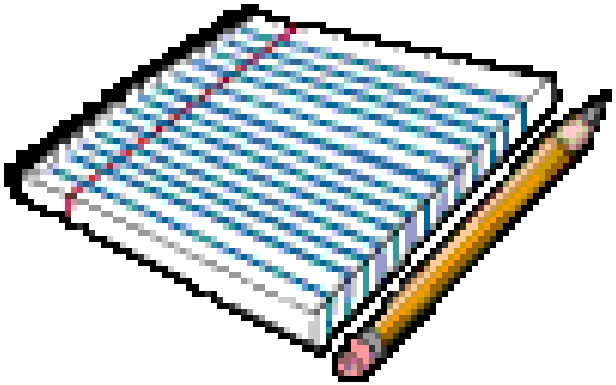
- ✓ Number of maternal deaths
- ✓ Maternal mortality Ratio (MMR)
- ✓ Maternal mortality Rate (MMRate)
- ✓ Lifetime risk of death (LTR)

LTR = 35 * MMRate

How do we measure maternal mortality?

Maternal mortality

Direct counting



Special surveys

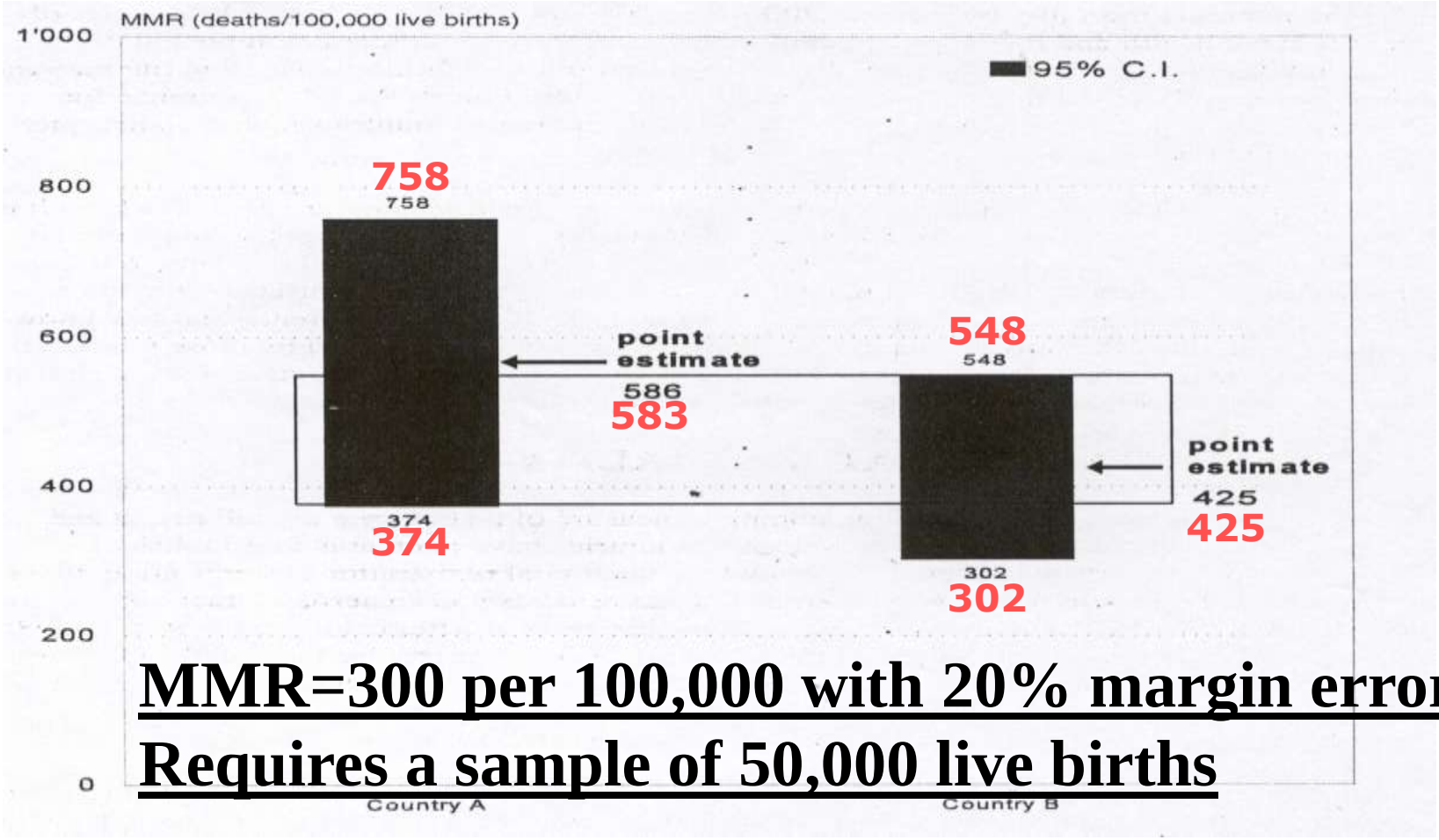
Direct counting

- ✓ 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 estimates really mean?



MMR=300 per 100,000 with 20% margin error

Requires a sample of 50,000 live births

Special surveys

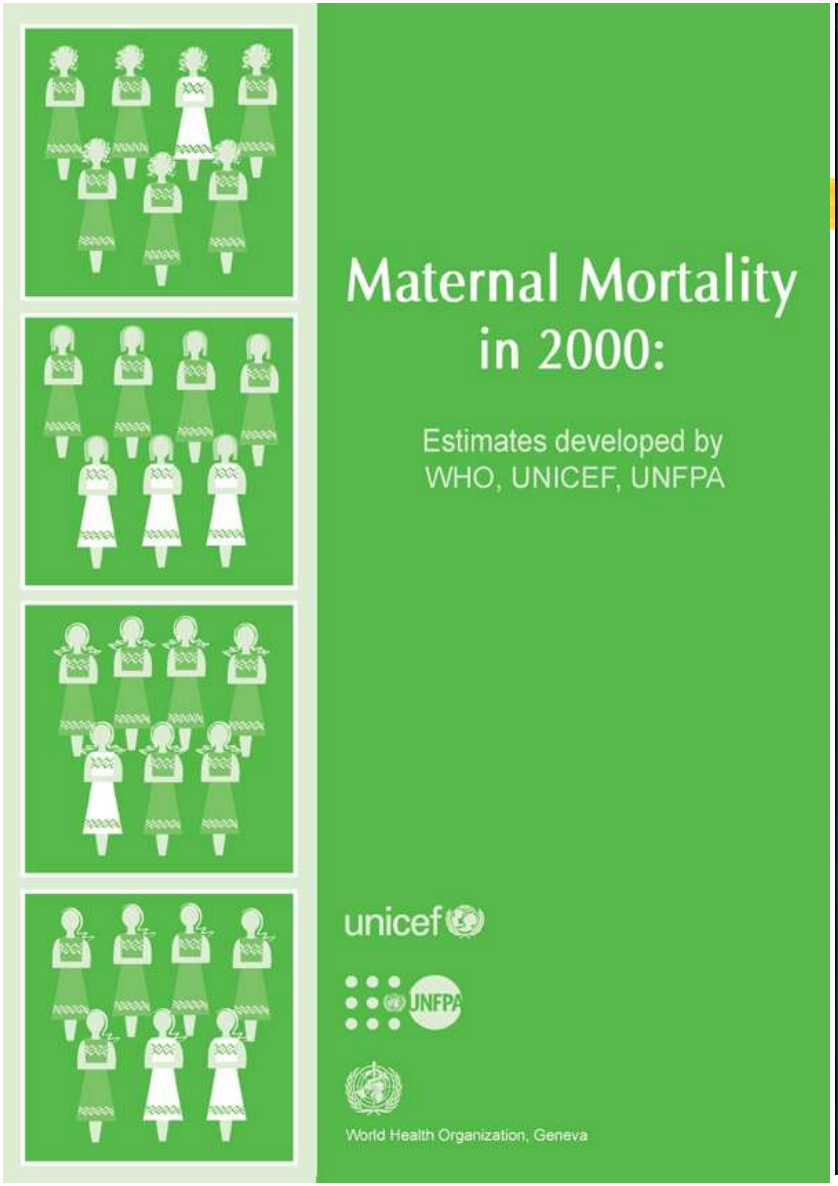
- ✓ Reproductive Age Mortality Studies (RAMOS)
- ✓ Direct household survey methods
- ✓ Direct/Indirect sisterhood methods

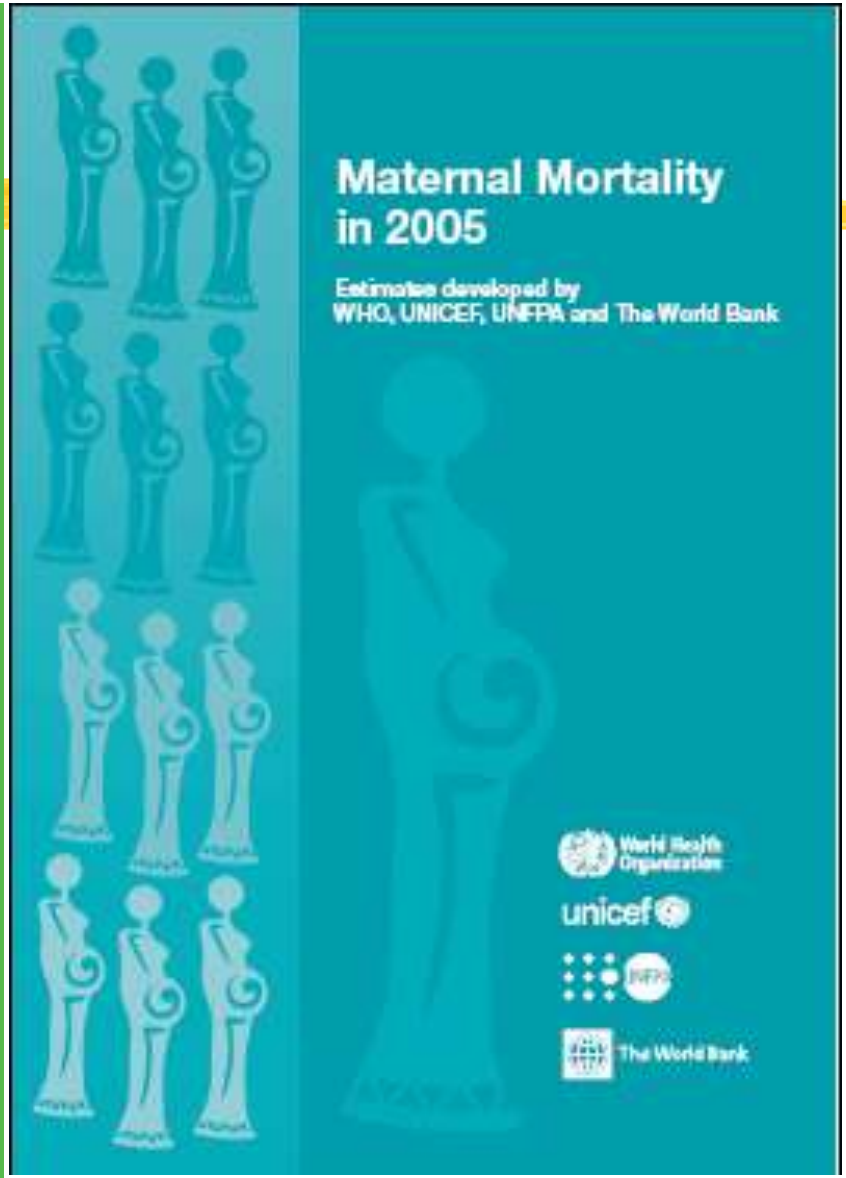
Sisterhood methods

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

Challenges?

- ✓ Different methodologies
- ✓ Precision - confidence intervals
- ✓ Timing of availability of data
- ✓ No data at all – same countries





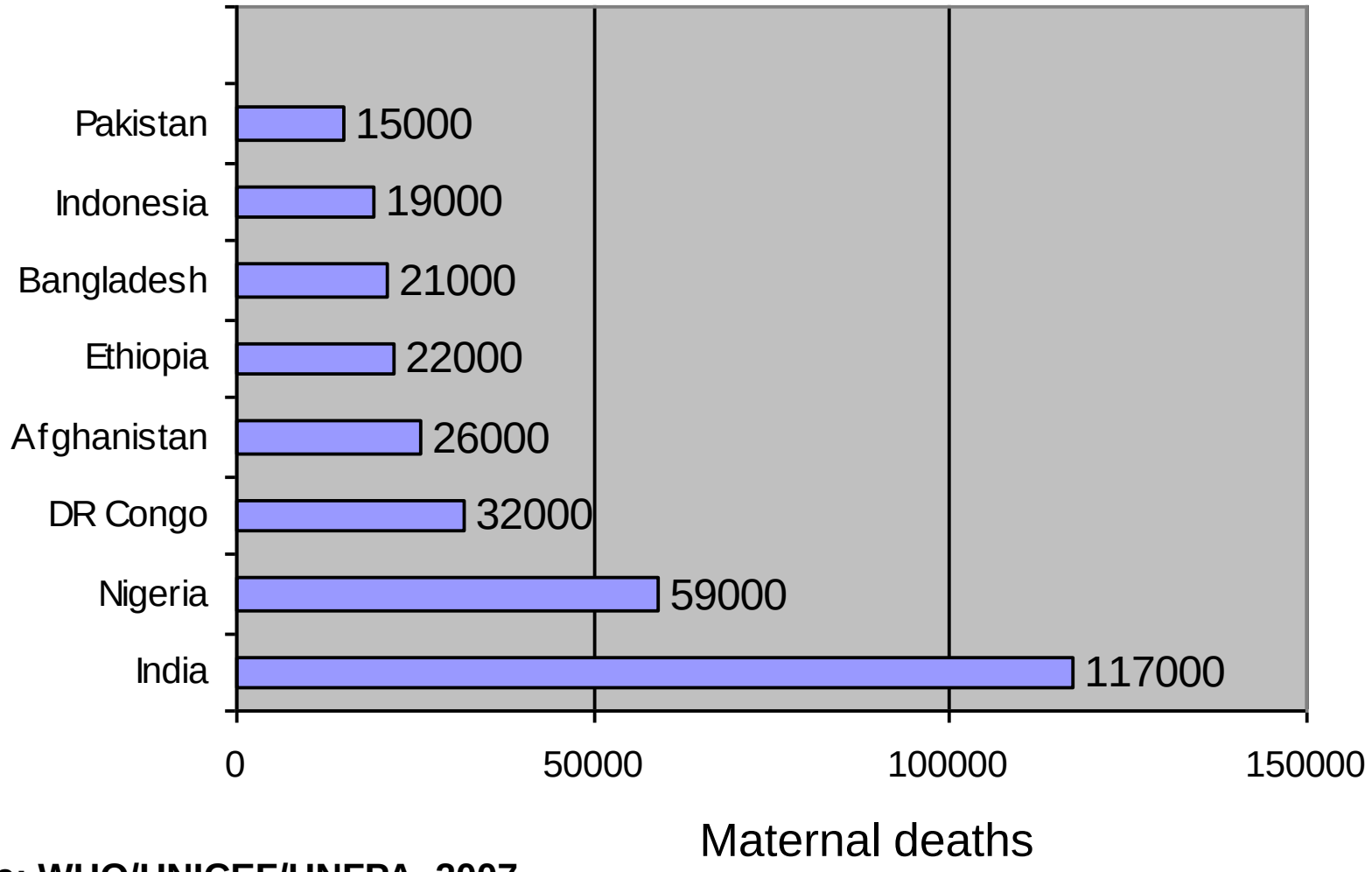
Source: http://www.who.int/reproductive-health/publications

Maternal mortality estimates 2005

Region	MMRatio (maternal deaths per 100,000 live births)	Number of maternal deaths	Lifetime risk of maternal death, 1 in:
World total	400	536,000	92
Developed countries	9	960	7,300
Countries of the commonwealth of independent states	51	1,800	1,200
Developing countries	450	533,000	75

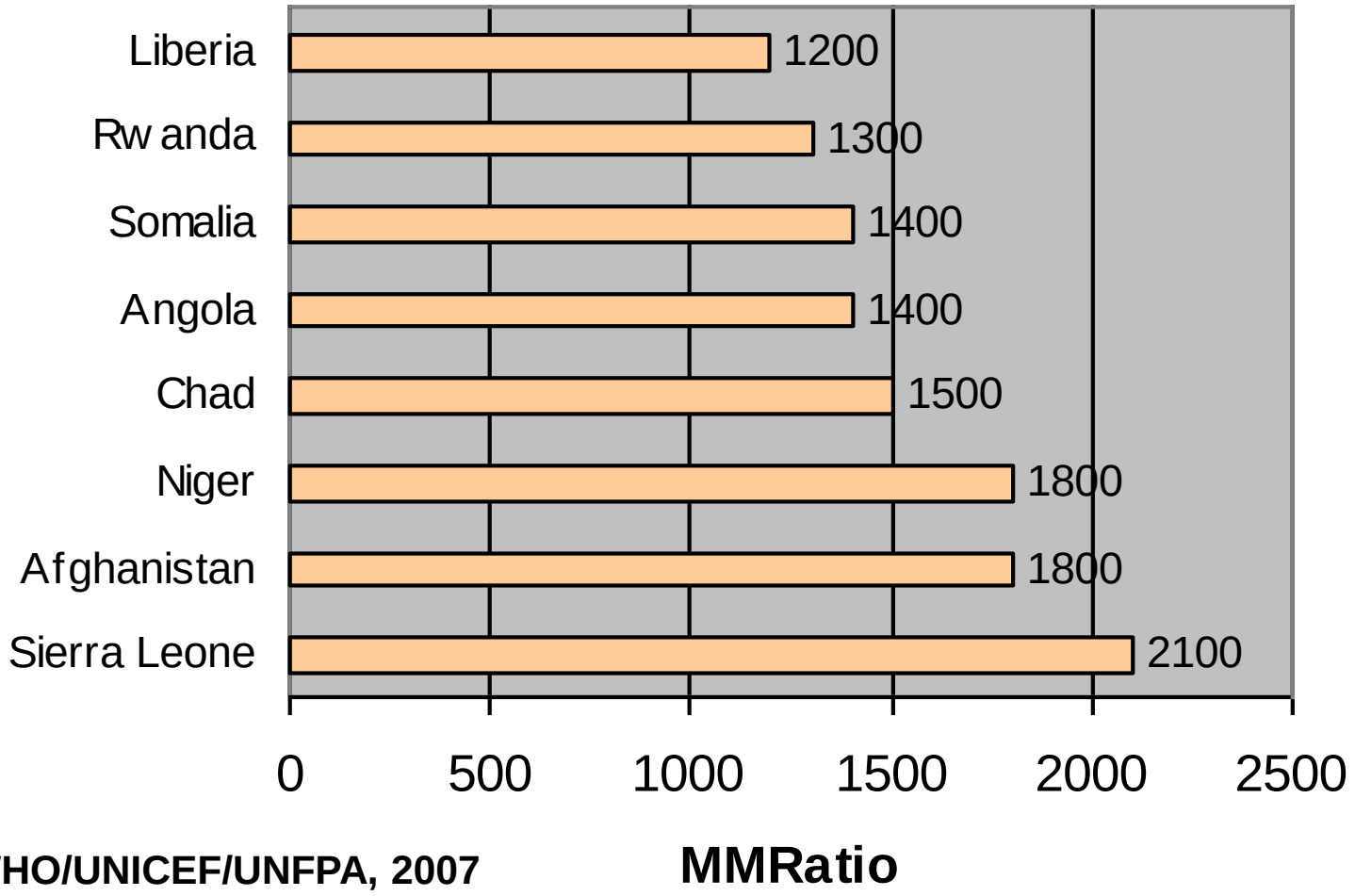
Source: WHO/UNICEF/UNFPA, 2007

Priority:
~60% of all maternal deaths



Source: WHO/UNICEF/UNFPA, 2007

Priority: Countries with highest MMRatios



Source: WHO/UNICEF/UNFPA, 2007

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

*** RAMOS
** Sisterhood
* Model

Source: WHO/UNICEF/UNFPA, 2001

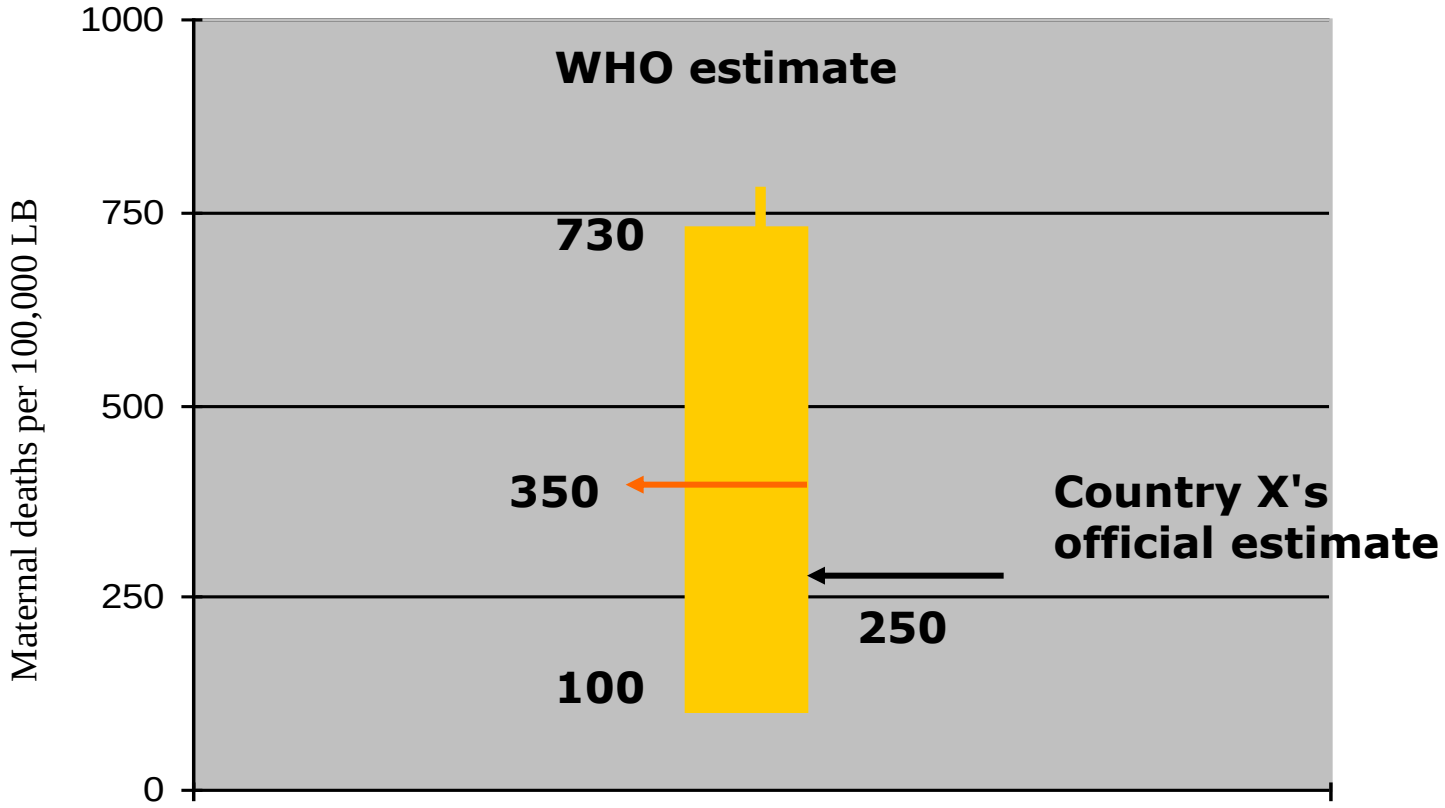
Difficulty in monitoring trends

Country	1990 Deaths	1990 MMR	1995 Deaths	1995 MMR	2000 Deaths	2000 MMR
India	147,000*	570	110,000***	440	136,000 +	540
Ethiopia	33,000*	1400	46,000*	1800	24,000 **	850
Indonesia	31,000*	650	22,000**	470	10,000 *	230
Bangladesh	33,000*	850	20,000*	600	16,000 +	380
Dem Rep of Congo	16,000*	870	20,000*	940	24,000 *	990
China	22,000***	95	13,000***	60	11,000 ***	56

*** RAMOS
** Sisterhood
* Model
+Direct survey

Source: WHO/UNICEF/UNFPA, 2004

What does the estimate really mean?



Measuring maternal morbidity

- ✓ Hospital-based
- ✓ Community-based

Measuring maternal mortality: New approaches/tools

- ✓ Sampling Service Sites (SSS)
- ✓ MAternal DEaths from Informants (MADE-IN)
- ✓ Follow-On-Review tool (MADE-FOR)
- ✓ Rapid Ascertainment Process for Institutional Deaths (RAPID)
- ✓ Interpretation of Verbal Autopsy-Maternal (InterVA-M)

Hospital-based

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

Community-based

- ✓ Interview surveys
  - ✓ Medically-diagnosed diseases
- ✓ Clinical examinations
- ✓ Laboratory measurements
- ✓ Interview-based diagnosis

Differentials in definitions

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

“What gets measured gets done”

WHO Director General,
4 January 2007

Art for Health

(http://www.who.int/reproductive-health/artforhealth/index.htm)

- ✓ Disparities
- ✓ Increase information
- ✓ Greater advocacy
- ✓ Change of image
- ✓ Increase awareness through contemporary art