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The WHO Application of ICD-10 to deaths during pregnancy, childbirth and the puerperium: ICD-MM

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Special Programme of Research, Development and Research Training in Human Reproduction

UN Millennium Development Goals

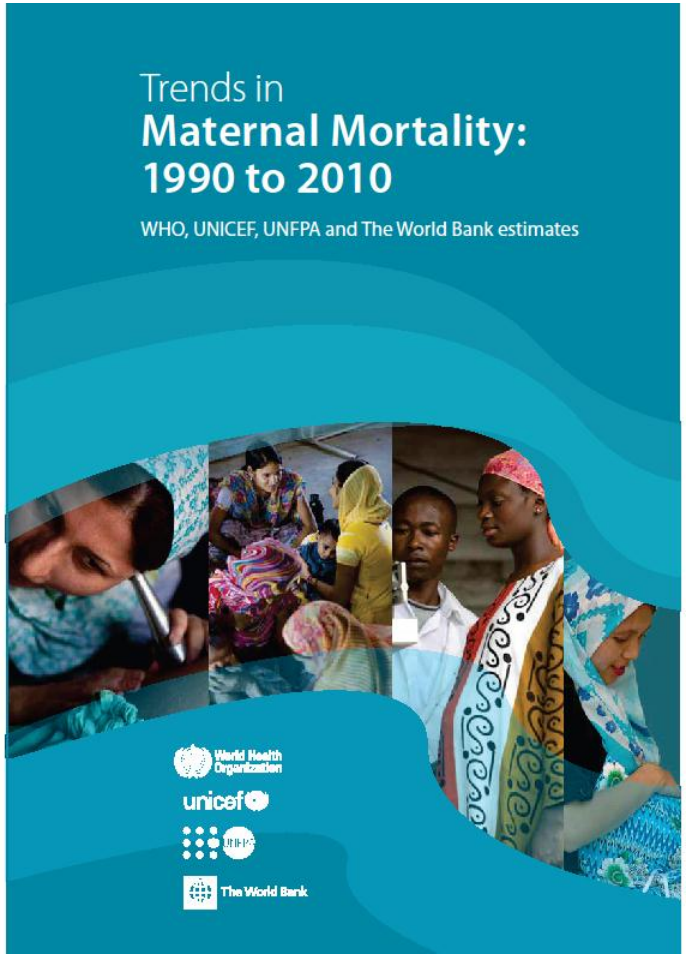
MDG 5: Improve Maternal Health

- Target 5.A: Reduce by three quarters, between 1990 and 2015, the maternal mortality ratio

- Target 5.B: Achieve, by 2015, universal access to reproductive health

Trends in Maternal Mortality: 1990 to 2010

- Reviewed by the technical advisory group (TAG) with experts from academic institutions: Berkeley, Harvard, Hopkins, Texas, Aberdeen, Umea, Statistics Norway
- Countries consulted for comments on methodology and additional input



Sources of Data

- Civil registration systems with cause of death assigned by attending physician
- Household surveys with sibling histories
- Sample vital registration systems
- Reproductive Age Mortality Surveys (RAMOS): not very common
- Population censuses with questions on household deaths
- Hospital- or facility-based studies
- Other

Maternal mortality in 1990-2010

WHO, UNICEF, UNFPA,The World Bank and UN Population Division Maternal Mortality Estimation Inter-Agency Group

Jamaica

ESTIMATED MMR

	MR)	Maternal deaths	Live births[a]	Proportion of maternal deaths among deaths of females of reproductive age (PM)	Lifetime risk of maternal death
	Per 100 000 live births (lb)	Numbers	Thousands	Per cent	1 in
2010	110 (77–170)	57 (39–85)	51	4.1 (2.9–6.1)	370
2005	89 (63–130)	48 (34–68)	54	3.7 (2.6–5.2)	430
2000	83 (58–120)	47 (33–66)	57	4.0 (2.8–5.5)	420
1995	62 (43–88)	37 (26–52)	59	4.3 (3.0–6.1)	500
1990	59 (42–84)	36 (26–52)	61	5.8 (4.1–8.2)	480
Annual % change					
1990-2000	3.5				
2000-2010	3.1				
1990-2010	3.3				

[a] World population prospects: the 2010 revision. New York, Population Division, Department of Economic and Social Affairs,United Nations Secretariat, 2011.

SOURCES of VR DATA

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Maternal deaths[b]	10	8	7	7	…	…	…	…	…	…	…	…	…	…	…
	1988-1992				1993-1997				1998-2002				2003-2007		
Adjusted MMR[c]	22				…				…				…		

[b] ICD10 codes O00-O99 Pregnancy, childbirth and the puerperium and A34 Obstetrical tetanus; ICD9 codes 630-676 Complications of pregnancy, childbirth and the puerperium.

[c] Points prepared for regression; appropriate adjustment made to match the definition and AIDS component of the estimates. See attached explanatory note for more details.

Other sources

SOURCES of study DATA

		Reported in the source					Adjusted MMR[c]	
		Period	Maternal deaths	Female deaths 15-49	Live births	PMDF (%)	MMR per 100 000 lb	per 100 000 lb
National maternal mortality surveillance system	Maternal	2010-2011	48	…	42,372	…	113	125
		2009-2010	31	…	44,006	…	70	77
National maternal mortality surveillance system	Maternal	2008-2011	41	1,247	43,735	…	…	99 [d]
National maternal mortality surveillance system	Maternal	2008-2009	44	1,247	44,828	…	98	104
Maternal mortality surveillance system (country consulta	Maternal	2007-2008	39	1,144	45,600	…	…	98 [d]
Maternal mortality surveillance system (country consulta	Maternal	2006-2007	42	1,098	46,300	…	…	107 [d]
Maternal mortality surveillance system (country consulta	Maternal	2005-2006	47	1,188	47,300	…	…	111 [d]
McCaw-Binns et al. West Indian Med J 2009; 58(6): 518	Maternal	2004-2005	34	1,150	47,100	…	…	73 [d]
McCaw-Binns et al. West Indian Med J 2009; 58(6): 518	Maternal	2003-2004	39	1,105	47,100	…	…	87 [d]
McCaw-Binns et al. West Indian Med J 2009; 58(6): 518	Maternal	2002-2003	48	1,209	48,600	…	…	101 [d]
McCaw-Binns et al. West Indian Med J 2009; 58(6): 518	Maternal	2001-2002	43	1,099	49,500	…	…	95 [d]
McCaw-Binns et al. West Indian Med J 2009; 58(6): 518	Maternal	2000-2001	45	1,073	56,100	…	…	99 [d]
McCaw-Binns et al. West Indian Med J 2009; 58(6): 518	Maternal	1999-2000	35	1,131	52,500	…	…	63 [d]
McCaw-Binns et al. West Indian Med J 2009; 58(6): 518	Maternal	1998-1999	36	1,070	48,100	…	…	72 [d]
McCaw&al. Int J Gynaec Obstet. 2008. 100:31-36.	Maternal	1993-1996	137	…	142,239	…	96	106

[c] Points prepared for regression; appropriate adjustment made to match the definition and AIDS component of the estimates. See attached explanatory note for more details.

[d] Used in the regression.

For further information visit: http://www.who.int/gho/mdg/maternal_health/situation_trends_maternal_mortality

Background

- ICD-10 clearly defines maternal mortality
- Interpretation of ICD-10 coding rules regarding maternal mortality is inconsistent

Background

- Many countries use the ICD as the standard tool for vital registration
- Epidemiology studies
- Surveillance, death audits and monitoring, facility surveys
- Individual patient records, electronic health records, and Reimbursement and health system financing;
- Reference for treatment guidelines, scientific literature and research
- Quality assessment at the level of individual cases up to assessment of health system outcomes and monitoring.

What is the problem

- In 2010 MMEIG estimated 287 000 maternal deaths
  - the CAUSE of death is known for only a FRACTION
  - WHO database of over 60000 deaths between 2003 and 2009 have cause of death information

The problem

- Inconsistency in death attribution leads to misclassification of maternal deaths extracted from vital registration which in turn may bias the understanding of the magnitude and causes of maternal death.
- Misclassification most commonly seen when deaths associated with
  - Cardiovascular disorders
  - CNS disorders
  - Injuries
  - Indirect conditions

Identification of causes – confusion

- Causes/conditions that are assigned to deaths grouped differently
- Signs/symptoms given as a cause/disease entity
  - E.g., PPH
- Contributing condition given as cause/disease entity
  - HIV
  - Anaemia

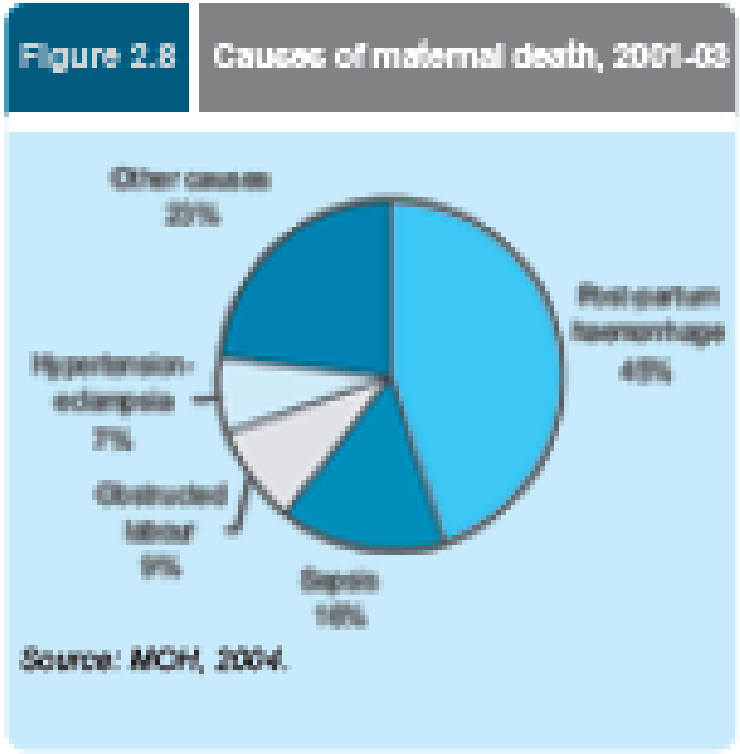
Why you should carefully complete the MCCD

Figure 1. Example of the medical certification of cause of death (MCCD).

Cause of death *the disease or condition thought to be the underlying cause should appear in the lowest completed line of part I*		Approximate interval between onset and death
Part I Disease or condition leading directly to death a)		
Antecedent causes: Due to or as a consequence of b)		
Due to or as a consequence of c)		
Due to or as a consequence of d)		
Part II Other significant conditions Contributing to death but not related to the disease or condition causing it		
The woman was: ☐ pregnant at the time of death ☐ not pregnant at the time of death (but pregnant within 42 days) ☐ pregnant within the past year		

Countries may add tick boxes to the form of medical certificate of cause of death (MCCD) to indicate pregnancy.

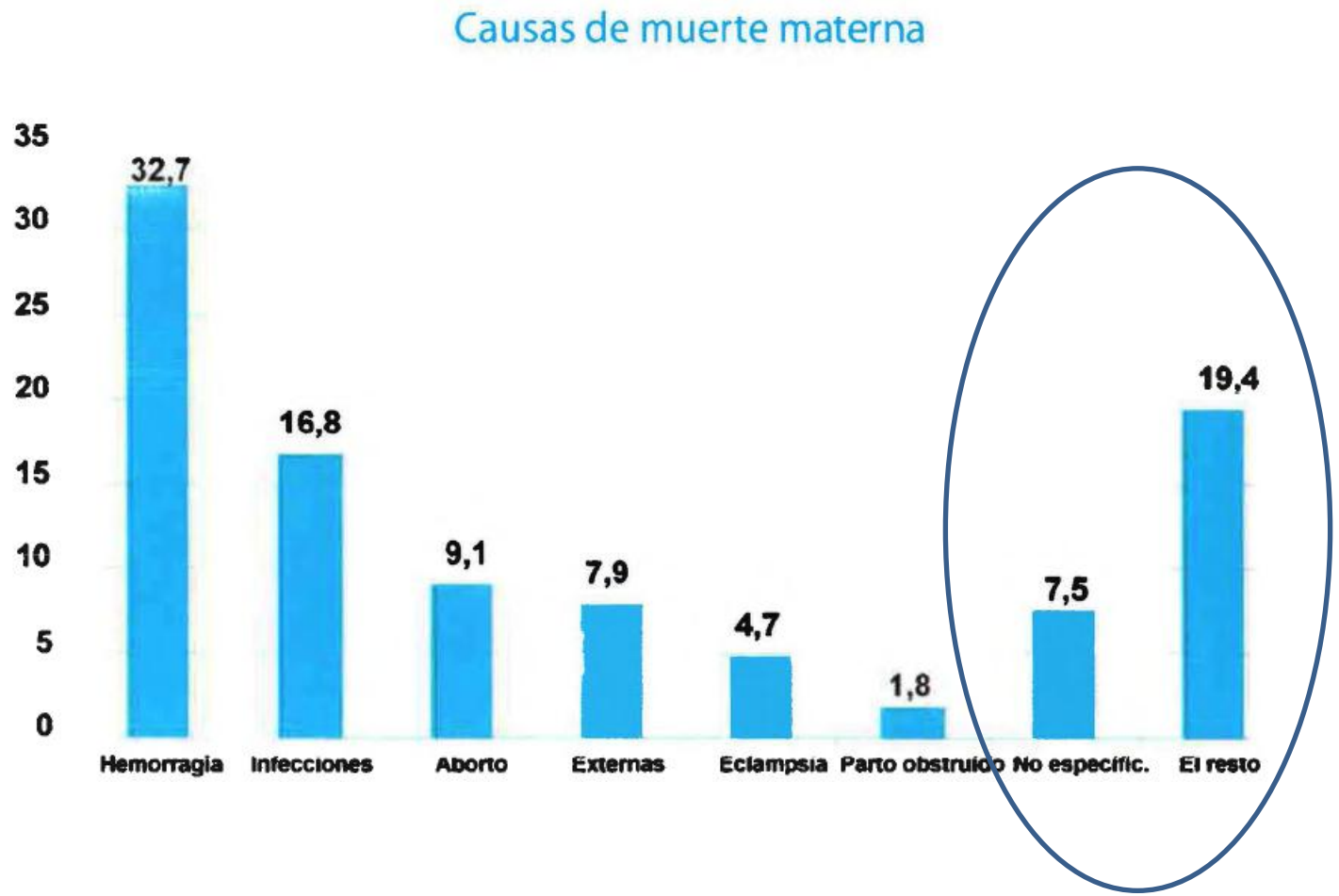
Cause of maternal death data: WPRO



- Postpartum haemorrhage 45%
- Sepsis 16%
- Obstructed labour 9%
- Hypertension/eclampsia 7%

- Other causes 23%

Cause of maternal death data: PAHO

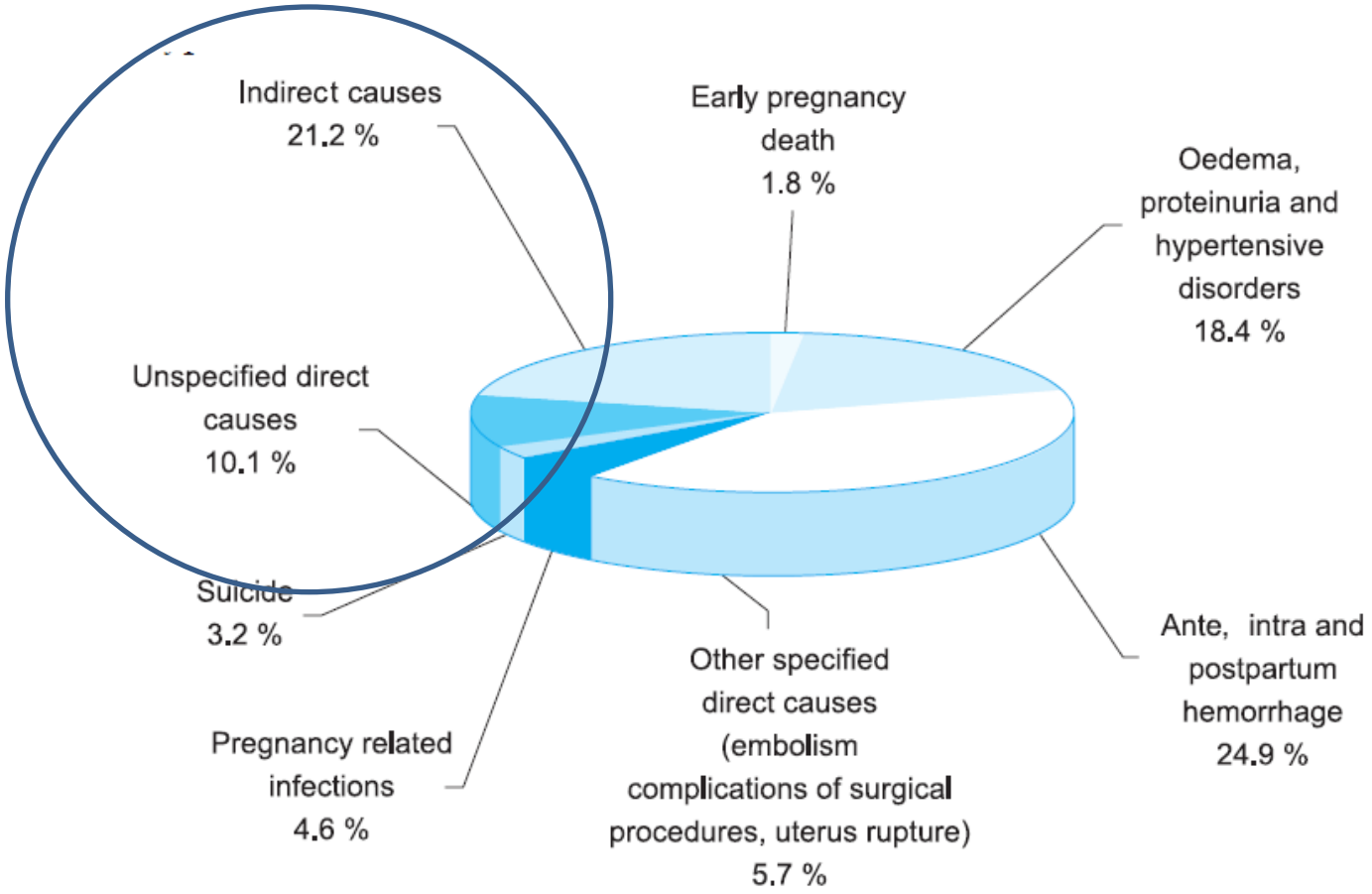


Cause of maternal death data: AFRO

Tableau 15 : Répartition des décès maternels selon la cause de 2007 à 2009 (en %)

Causes	2007	2008	2009
Hémorragie	15,0	26,1	22,3
Infection	14,1	21,2	22,3
Complication d'avortement	7,0	0,0	7,7
Eclampsie	7,0	7,2	7,4
Rétention placentaire	4,1	3,4	6,5
Rupture utérine	7,3	3,2	5,1
Disproportion foeto-pelvienne	3,7	1,7	0,6
Présentation vicieuse	2,7	1,2	0,6
Autres	39,0	36,1	27,4
Total	100,0	100,0	100,0

Cause of maternal death data: EURO



WHO Classification of maternal deaths

- Intended to simplify and standardize the capture of maternal deaths from VR and other sources of data
- *Current* version based upon ICD-10 codes

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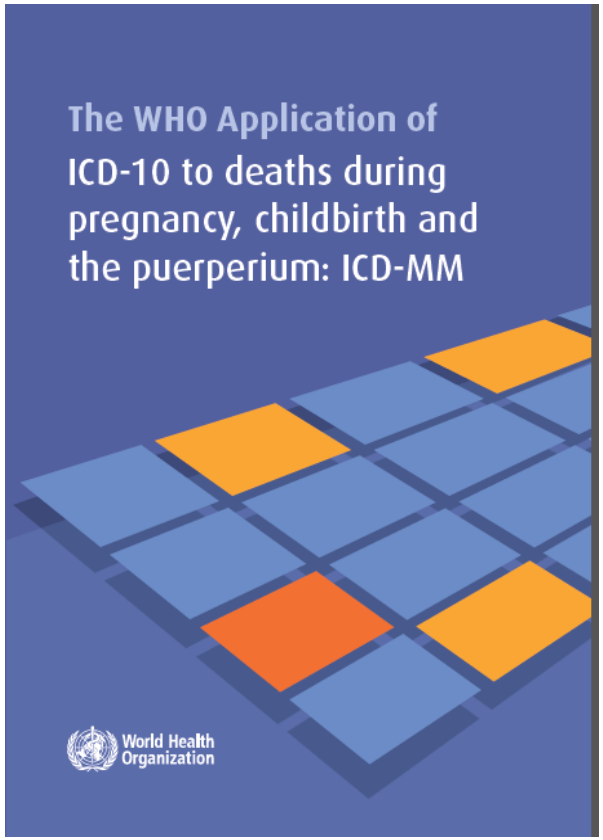


- Intended to simplify and standardize the capture of maternal deaths from VR and other sources of data
- *Current* version based upon ICD 10 code

http://www.who.int/reproductivehealth/publications/monitoring/9789241548458/en/

Classification system for maternal deaths - Principles

- Must be useful and understandable to those that use it, i.e. clinicians, epidemiologists and programme planners
- Specific condition/disease entity/**underlying cause** should be **exclusive** of all other conditions
- The new classification system should be compatible with and contribute to the 11th revision of the International Classification of Diseases (ICD)

Maternal death definition: ICD-10

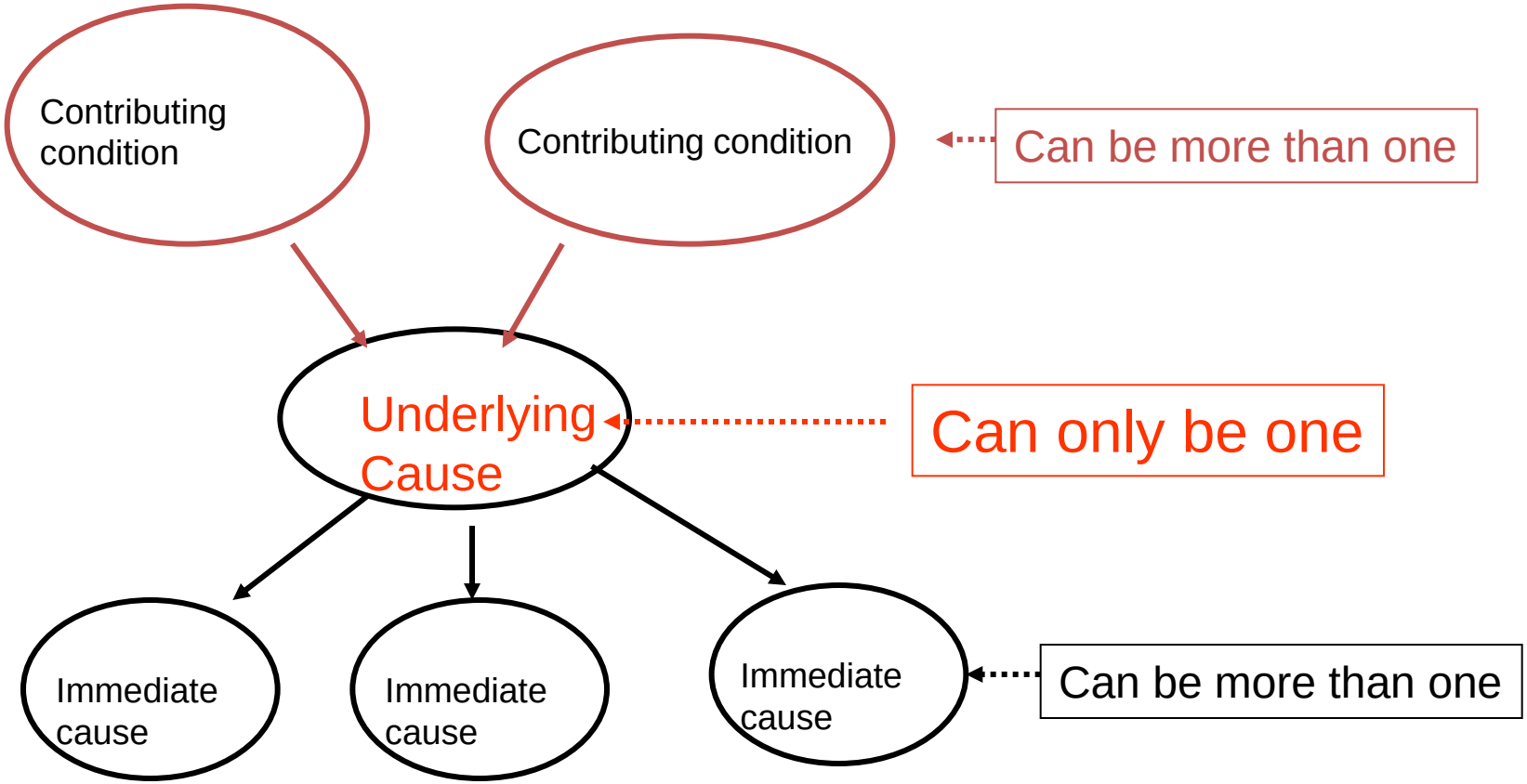
Pregnancy-related death

- Maternal death – death of a woman 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
  - Direct maternal death
  - Indirect maternal death
- Coincidental death

Overall structure of classification

- **Underlying cause**
  - The disease entity that initiated the events resulting in the death of the woman
  - There can only be one
  - An ICD-10 code can be allocated
- **Conditions that contributed to death**
  - Condition(s) present in the woman that may have contributed to (or be associated with) but did not directly cause her death
  - There may be more than one
  - Conditions may be pre-existing or develop during sequence of events leading to death

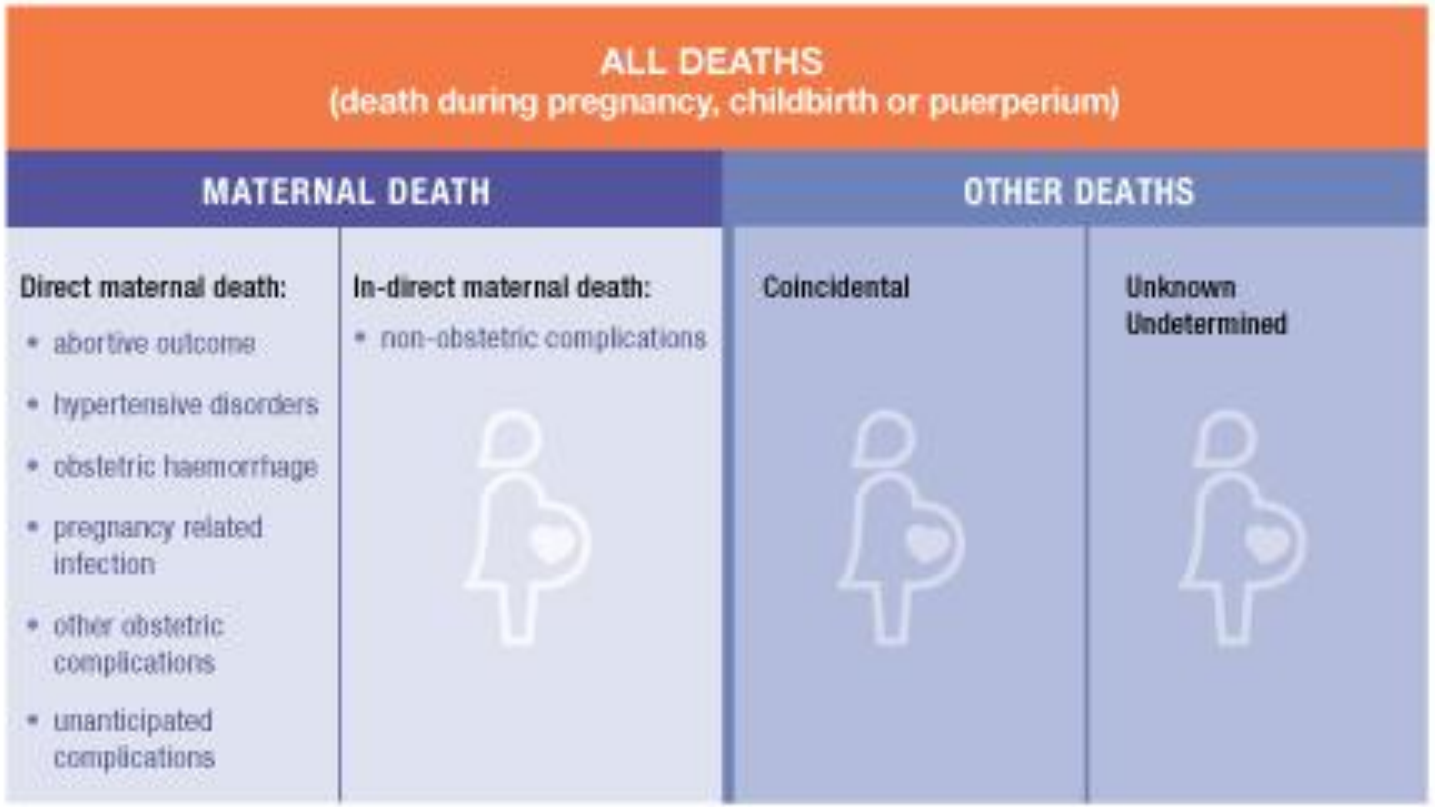
Relationship between contributing conditions and underlying cause and immediate causes of death



ICD-MM Groupings

Type	Group name	EXAMPLES of potential causes of death
Maternal death: direct	Pregnancies with abortive outcome	Abortion, miscarriage, ectopic pregnancy and other conditions leading to maternal death and a pregnancy with abortive outcome
Maternal death: direct	Hypertensive disorders in pregnancy, childbirth, and the puerperium	Oedema, proteinuria and hypertensive disorders in pregnancy, childbirth and the puerperium
Maternal death: direct	Obstetric haemorrhage	Obstetric diseases or conditions directly associated with haemorrhage
Maternal death: direct	Pregnancy-related infection	Pregnancy-related, infection-based diseases or conditions
Maternal death: direct	Other obstetric complications	All other direct obstetric conditions not included in groups to 1–4.
Maternal death: direct	Unanticipated complications of management	Severe adverse effects and other unanticipated complications of medical and surgical care during pregnancy, childbirth or the puerperium

ICD-MM



ICD-MM Groupings

Maternal death indirect	**Non-obstetric complications**	**Non-obstetric conditions** **•Cardiac disease (including pre-existing hypertension)** **•Endocrine conditions** **•Gastrointestinal tract conditions** **•Central nervous system conditions** **•Respiratory conditions** **•Genitourinary conditions** **•Autoimmune disorders** **•Skeletal diseases** **•Psychiatric disorders** **•Neoplasms** **•Infections that are not a direct result of pregnancy**
Death during pregnancy, childbirth and the puerperium	**Coincidental causes**	**Death during pregnancy, childbirth and the puerperium due to external causes**
Death during pregnancy, childbirth and the puerperium	**Unknown/undetermined**	**Death during pregnancy, childbirth and the puerperium where the underlying cause is unknown or was not determined**

Cause of death *the disease or condition thought to be the underlying cause should appear in the lowest completed line of part I*		*Approximate interval between onset and death*
1 Disease or condition leading directly to death	(a)hypovolaemic shock	10 minutes
Antecedent causes: Due to or as a consequence of	(b)postpartum haemorrhage	
Due to or as a consequence of	(c)uterine atony	45 minutes
Due to or as a consequence of	(d)	
II Other significant conditions Contributing to death *but not related to the disease or condition causing it*	Anemia	preexisting

A contributory cause indicated in Part I. This is assigned a code when multiple cause coding is undertaken

The underlying cause. This is the last condition noted in Part 1 and is a condition found in Annex B1

Contributory condition indicated in part II. This is assigned a code when multiple cause coding is undertaken

What happened to OBSTRUCTED LABOR?

- Obstructed labour may be start of sequence or consequence
- Are deaths mis-attributed, and is operative delivery the only need?
- Need to understand the reasons and consequences of obstructed labour
- Proposed "linked" codes for ICD-11

example

A woman with a baby in breech position who experiences obstructed labour and dies of puerperal sepsis

- Underlying cause: Group 4, pregnancy-related infection
- Category: puerperal sepsis
- Contributing condition: obstructed labour due to fetal malpresentation

Anaemia

- With exception inherited anemias (sickle cell, thalessemia), usually secondary sign
- Rarely causes death on own
- Even where complicates PPH, it is still almost always haemorrhage that caused the death

example

A woman who had anaemia during pregnancy and after delivery had a post partum haemorrhage due to uterine atony, and died due to hypovolaemic shock

- Underlying cause: Postpartum haemorrhage due to uterine atony
- Immediate cause: Hypovolaemic shock
- Contributing condition: Anaemia

Suicide

- Coded to Chapter XX in VR data
  - Not considered within international MMR estimation methodology
  - May be picked up in surveillance studies
- Grouped into "other direct"

HIV

- It is possible to die "with" or "from" AIDs
- Contrast between AIDs related indirect maternal deaths and where HIV is a contributory condition
  - O98.7
  - B20-B24

example

A woman with AIDS who has a spontaneous abortion that becomes infected and dies due to septic shock and renal failure

- Underlying cause: Septic miscarriage
- Immediate cause: Septic shock, renal failure
- Contributing condition: HIV/AIDS

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Downloads

– Full text
– Codes in ICD-MM
xlsx, 68kb

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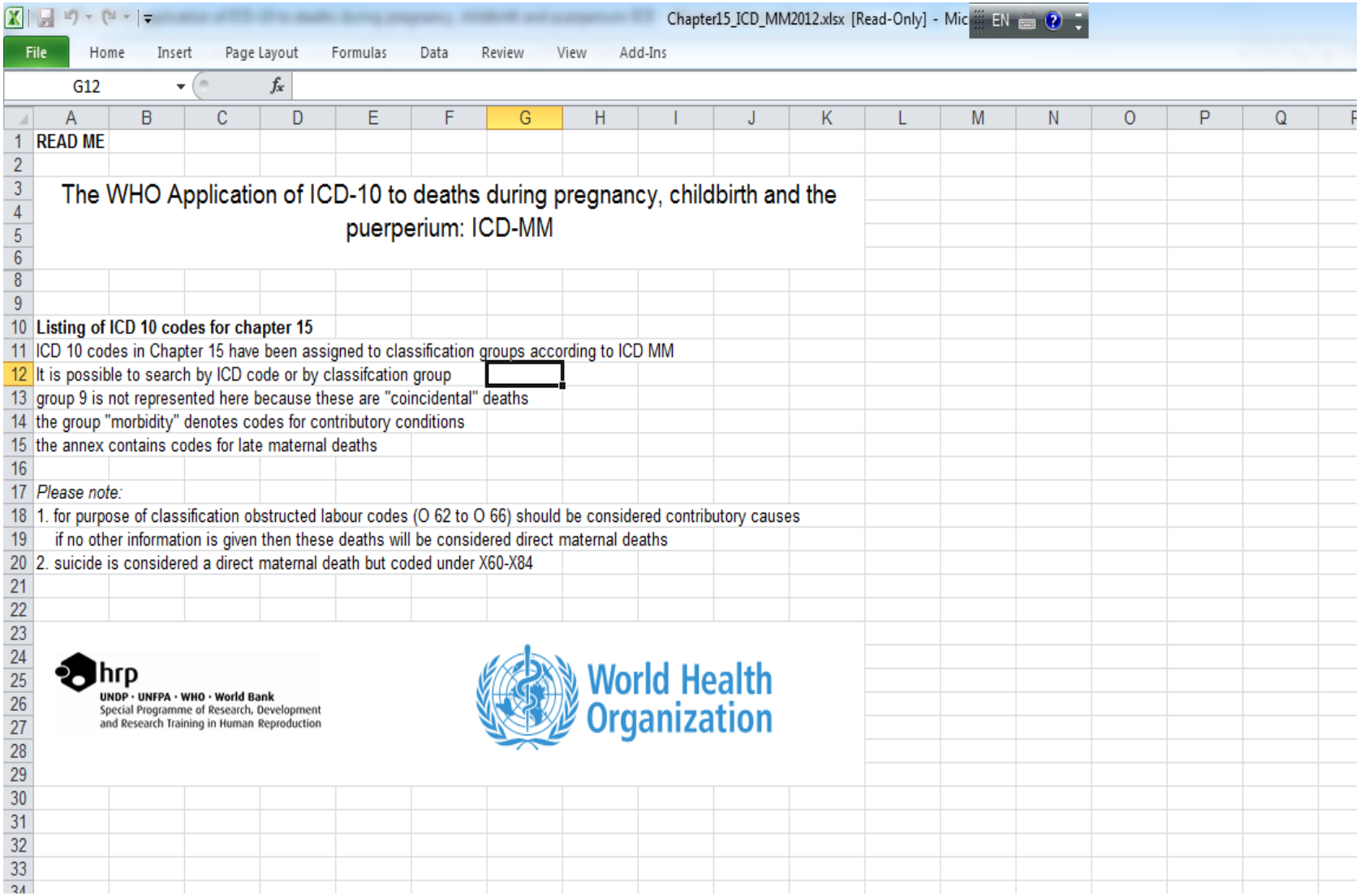
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The WHO Application of ICD-10 to deaths during pregnancy, childbirth and the puerperium: ICD-MM
Listing of ICD 10 codes for chapter 15
ICD 10 codes in Chapter 15 have been assigned to classification groups according to ICD MM
It is possible to search by ICD code or by classifcation group
group 9 is not represented here because these are "coincidental" deaths
the group "morbidity" denotes codes for contributory conditions
the annex contains codes for late maternal deaths
Please note:
1. for purpose of classification obstructed labour codes (O 62 to O 66) should be considered contributory causes
if no other information is given then these deaths will be considered direct maternal deaths
2. suicide is considered a direct maternal death but coded under X60-X84
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Conclusion/recommendations

- The new maternal death classification system should be adopted by all countries
- By using the same classifications, reliable comparisons can be made within and between countries and regions
- Applying this classification should help to identify the health system shortfalls that countries need to address in order to reduce fatal outcomes of pregnancy and childbirth

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