Maternal mortality and severe morbidity in the UK: trends and key messages for care

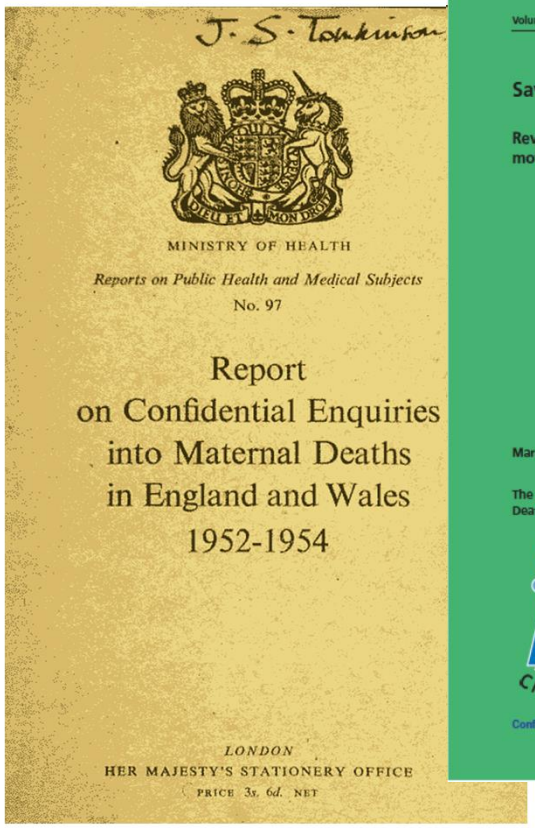
Marian Knight

Professor of Maternal and Child Population Health

National Perinatal Epidemiology Unit
University of Oxford, UK

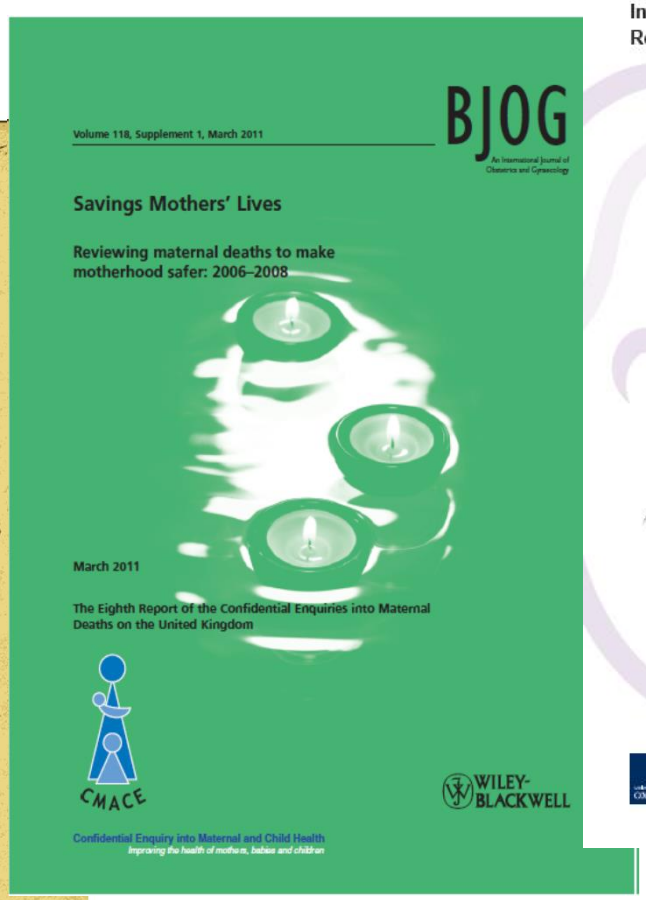
Maternal Mortality in the UK

1952-54



90 per 100,000 maternities

2006-08



11 per 100,000 maternities

2009-12

Maternal, Newborn and Infant Clinical Outcome Review Programme

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10 per 100,000 maternities

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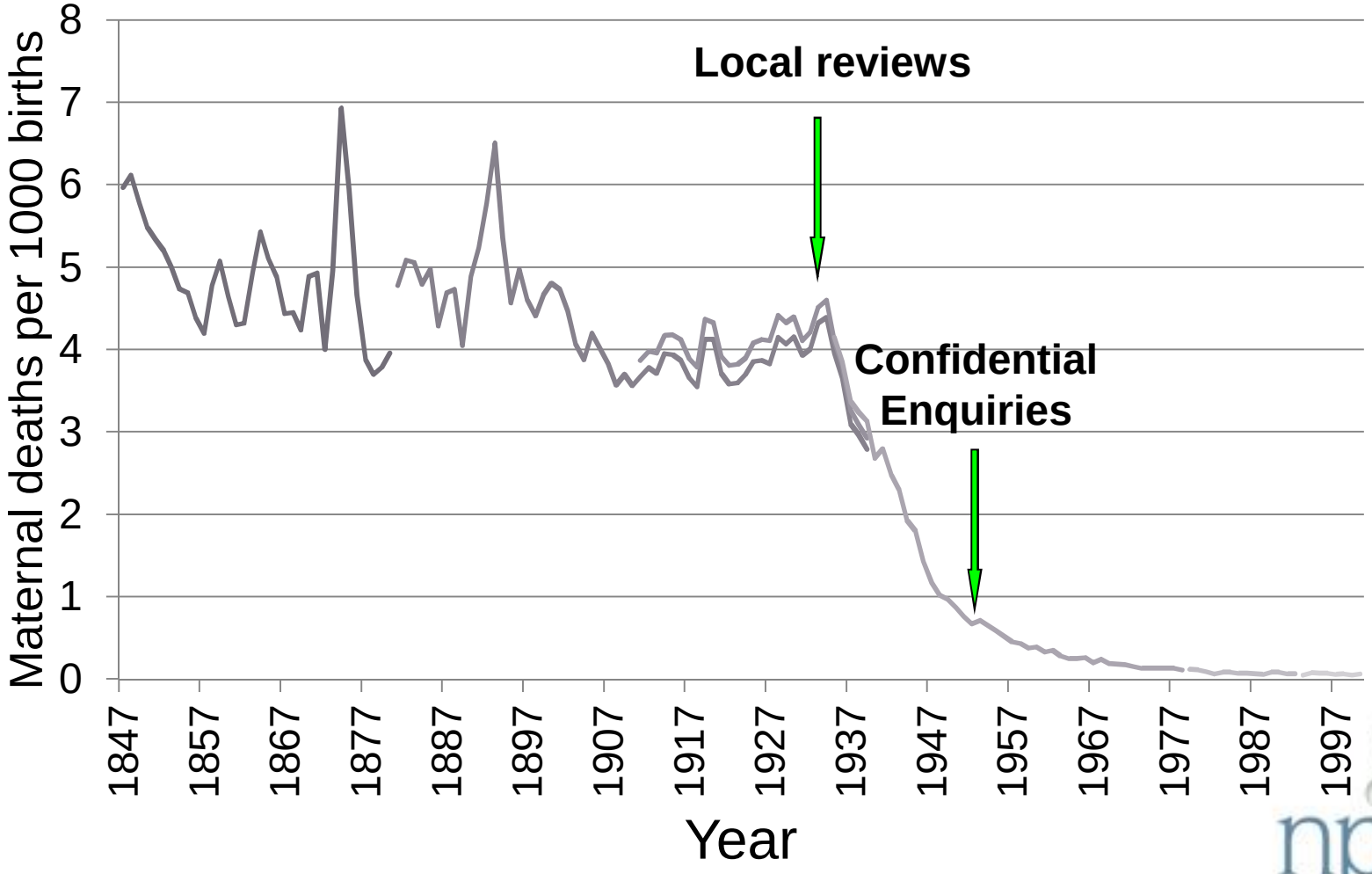
UK Maternal Mortality



Sources: General Register Office, OPCS and ONS, *Birth Counts* tables A10.1.1-A10.1.4

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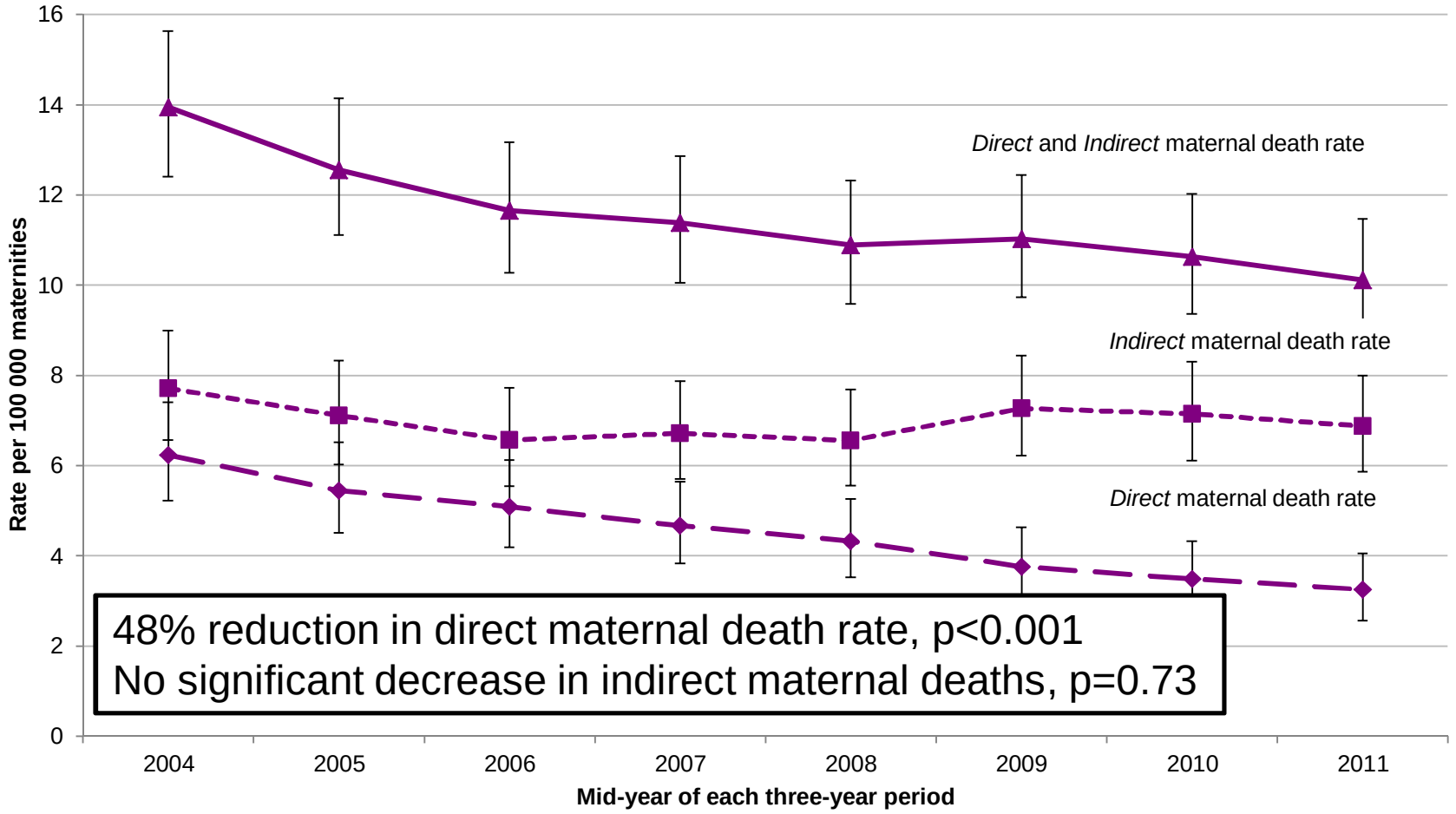
Maternal death rate 2003-12

(Three year rolling averages)



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International comparisons

- UK Confidential Enquiry
  - 10.1 per 100,000 maternities (95%CI 8.9-11.5) for 2010-12
- Italy (Record Linkage Study)
  - 11.8 per 100,000 live births (95%CI 9.8-14.1) for 2000-07
- France Confidential Enquiry
  - 10.3 per 100,000 live births (95%CI 9.1– 11.6) for 2007– 09
- Netherlands Confidential Enquiry
  - 5.0 per 100,000 live births (95%CI 3.5-6.9) for 2009-12

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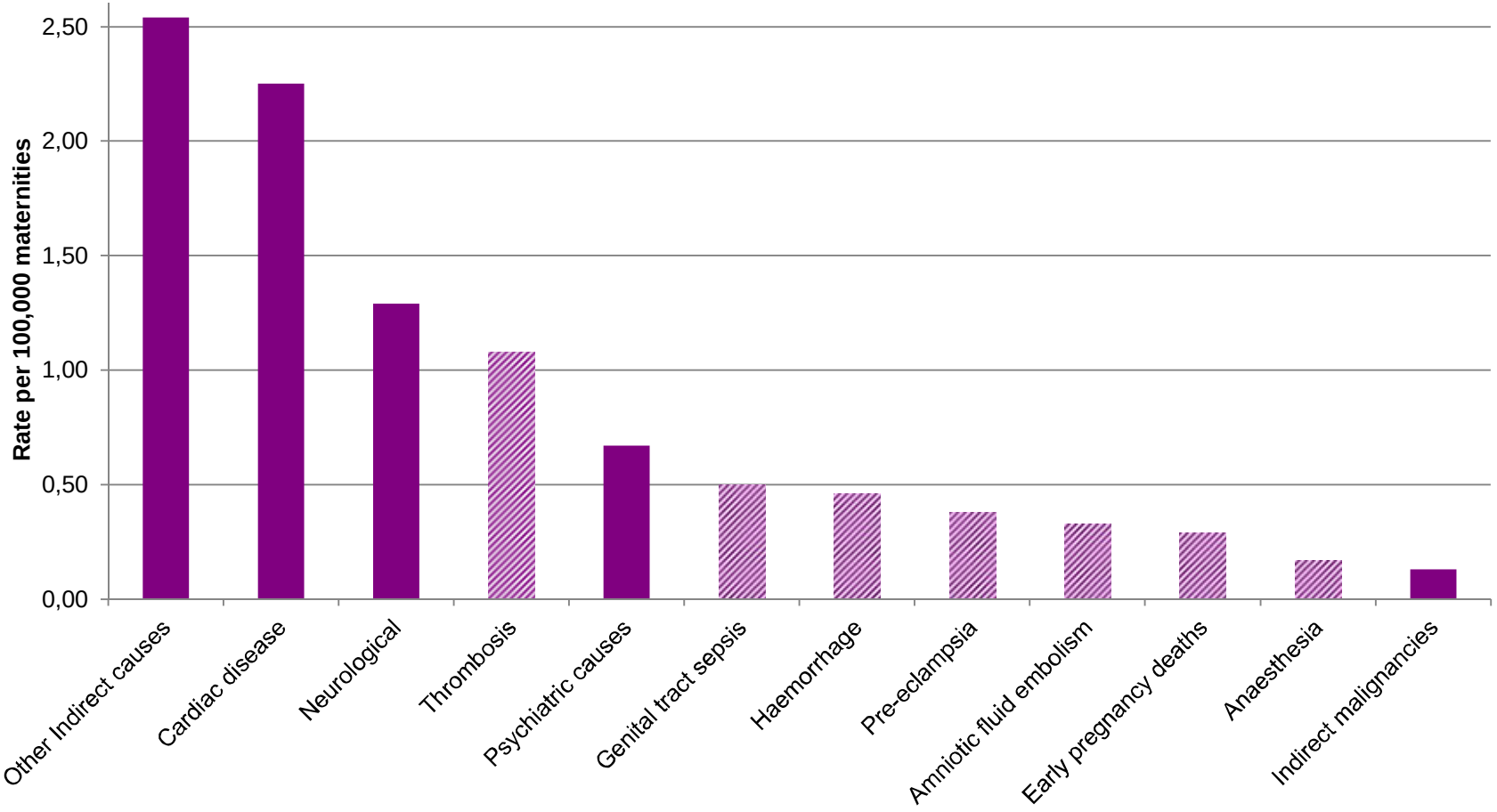
Causes of maternal death



Solid bars show indirect causes, hatched bars show direct causes

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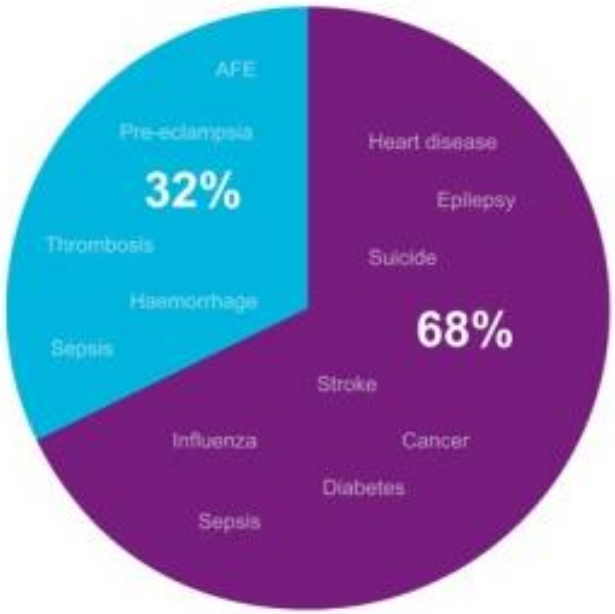
Causes of maternal death

Causes of mothers' deaths

Two thirds of mothers died from medical and mental health problems in pregnancy and **only one third** from direct complications of pregnancy such as bleeding.



Women with pre-existing medical and mental health problems need:

- Pre-pregnancy advice
- Joint specialist and maternity care

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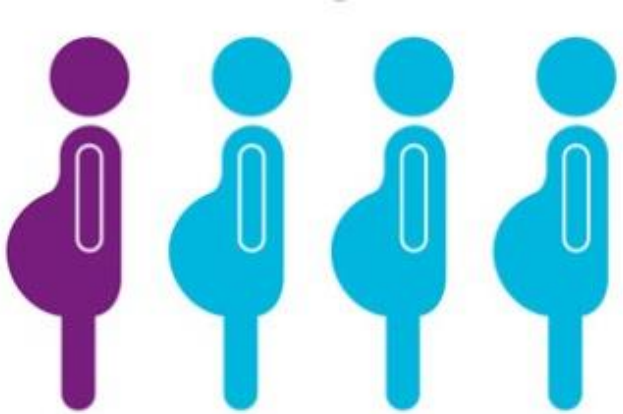
Sepsis ï all causes



Almost a quarter of women who died had **Sepsis** (severe infection).

Women with sepsis need:

- Early diagnosis
- Rapid antibiotics
- Review by senior doctors and midwives

Prompt treatment and action can make the difference between life and death

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A womanôs story: sepsis

Two hours after delivery a woman became unwell on the postnatal ward feeling faint. Her oxygen saturation was low. She was reviewed by junior staff and found to be shocked, without evidence of major bleeding. ***Her temperature was never measured.*** *A diagnosis of haemorrhage was made and she was treated with fluids. She failed to improve and was taken to theatre where she had a cardiac arrest and could not be revived. At postmortem she was found to have overwhelming infection due to Group A Streptococcus.*

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A womanôs story; sepsis

Seven days after giving birth a woman became unwell at home with a fever. She was advised to attend the maternity unit immediately. ***On admission she was noted to be breathless with a rapid pulse and high temperature. She was seen quickly by the on call doctor.*** *A diagnosis of severe infection was made and fluid resuscitation started immediately. Intravenous antibiotics were started within one hour of the diagnosis and she was transferred to the high dependency unit. She made a full recovery. Early recognition, clear advice and prompt treatment led to a good outcome without any further complications.*

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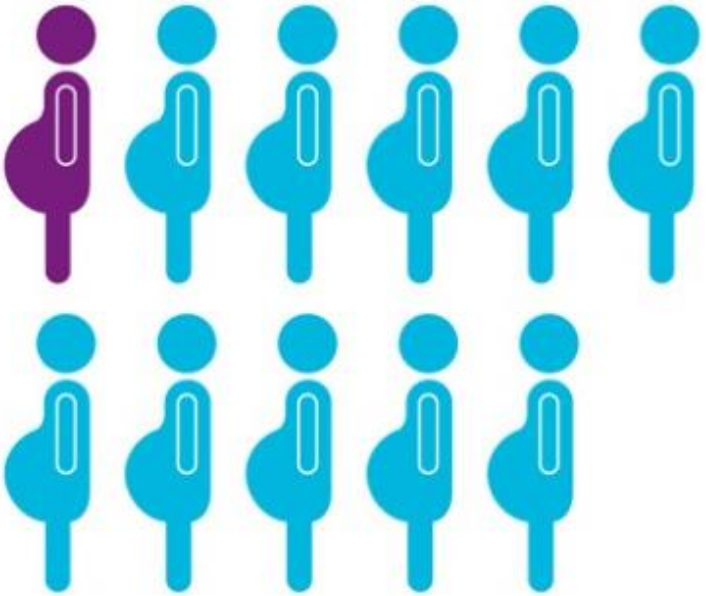
Influenza



1 in 11 of the women died from **Flu**

More than half of these women's deaths could have been prevented by a flu jab.

Flu vaccination will save mothers' and babies' lives

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A womanôs story: influenza

ñ*A pregnant woman who smoked refused vaccination offered by her GP for seasonal influenza or H1N1. She presented in the third trimester with flu-like symptoms including fever, cough and dyspnoea. Rapid deterioration led to her requiring ventilation in ITU, but she died within 24 hours of admission*ò

Maternal mortality rate by age

	Rate per 100,000 maternities	95% CI	Relative risk (RR)	95% CI
Age				
<20	8.7	4.9-14.3	1.26	0.65-2.33
20 ï 24	6.9	4.9-9.3	1	
25 ï 29	8.3	6.5-10.4	1.21	0. 81-1.81
30 ï 34	9.6	7.7-11.9	1.40	0.96-2.09
35 ï 39	15.2	12.0-19.0	2.22*	1.50-3.32
Ó40	22.7	15.1-32.8	3.30*	1.96-5.47

*Significantly raised compared to women aged 20-24

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Maternal mortality rate by ethnic group

	Rate per 100,000 maternities	95% CI	Relative risk (RR)	95% CI
Ethnicity (England only)				
White (inc. not known)	9.0	7.8 -10.4	1	
Indian	20.5	11.9-32.8	2.27*	1.30-3.74
Pakistani	13.9	7.8-22.8	1.53	0.84-2.60
Bangladeshi	11.1	3.0-28.4	1.23	0.33-3.20
Other Asian	8.1	2.9-17.6	0.90	0.32-1.99
Caribbean	18.5	6.0-43.2	2.05	0.66-4.87
African	26.9	17.6-39.4	2.98*	1.90-4.51
Others/ mixed	10.2	5.6-17.1	1.13	0.61-1.94

*Significantly raised compared to white women

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Maternal mortality rate according to country of birth

Woman's country of birth	Rate per 100,000 maternities	95% CI	Relative risk (RR)	95% CI
UK	8.6	7.5 to 9.8	1	-
Outside UK	15.2	12.5 to 18.3	1.77*	1.39 to 2.24
Bangladesh	9.0	1.9 to 26.3	1.05	0.21 to 3.11
India	14.5	6.3 to 28.6	1.69	0.72 to 3.39
Pakistan	10.9	4.7 to 21.4	1.27	0.54 to 2.54
Sri Lanka	29.4	8.0 to 75.1	3.42	0.92 to 8.89
Ghana	22.0	4.5 to 64.2	2.56	0.52 to 7.59
Nigeria	34.2	16.4 to 62.9	3.99*	1.88 to 7.48
Somalia	17.8	4.8 to 45.5	2.07	0.56 to 5.38
Poland	8.9	3.6 to 18.3	1.03	0.41 to 2.17

*Significantly raised compared to women born in the UK

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Other characteristics of women who died

Medical condition/ characteristic	Direct (n=106) Frequency (%)	Indirect (n=215) Frequency (%)	Total (n=321) Frequency (%)
Body mass index (BMI) kg/m²			
<18	1 (0.9)	5 (2.3)	6 (1.9)
18 ï 24	35 (33.0)	89 (41.4)	124 (38.6)
25 ï 29	28 (26.4)	44 (20.5)	72 (22.4)
Ó30	31 (29.3)	56 (26.0)	87 (27.1)
Missing	11 (10.4)	21 (9.8)	31 (10.0)
Mental health problems			
Yes	12 (11.3)	42 (19.5)	54 (16.8)
No	87 (82.1)	165 (76.7)	252 (78.5)
Any pre-existing medical condition (excluding obesity)			
Yes	74 (69.8)	163 (75.8)	237 (73.8)
No	25 (23.6)	44 (20.5)	69 (21.5)
Missing	7 (6.6)	8 (3.7)	15 (4.7)

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New work ï maternal morbidity

- New morbidity topic selected annually
- Confidential enquiry of a **sample** of approximately 30-40 cases nationally
- Cases can be identified through a variety of sources depending on the topic
- 2014 morbidity enquiry ï sepsis
- Future morbidity enquiries ï psychosis, cardiac disease

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Why study morbidity?

- Near-miss events are more common than maternal deaths and conclusions from studies may therefore be more robust
- Study of near-miss events may give more insight into risk factors and possible means of prevention, particularly in countries where deaths are rare and events associated with death may be atypical
- Because the woman survives, studies may be seen as less threatening than death reviews
- The woman herself may be interviewed about her perspectives on the care she received

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UKOSS

UK Obstetric Surveillance System

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UK Obstetric Surveillance System (UKOSS)

- Monthly prospective case collection from obstetrician, midwife, obstetric anaesthetist and risk midwife (individualised by hospital)
- Cohort or case control studies conducted as well as descriptive studies
- Rolling programme of studies
- Central data collection

UKOSS
UK Obstetric Surveillance System

Uses of UKOSS Data

- Disease incidence/prevalence
- Audit of guidelines/change in practice
- Risk factors
- Management techniques
- Public health response
- Outcomes
- Investigating disease progression

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Impact/Audit: Eclampsia

- UKOSS study 2005-6 identified
  214 confirmed cases
  - Incidence 2.7 per 10,000 (95% CI 2.4-3.1)[ÿ]

- Incidence in 1992 4.9 per 10,000
  (95% CI 4.5-5.4)*[À]

* p<0.0001

[ÿ]Knight M on behalf of UKOSS 2007 BJOG 114: 1072-1078
[À]Douglas and Redman 1994 BMJ 309:1395-1400

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Risk factors: Placenta accreta

- Previous caesarean delivery

84% of affected women, 15% of control women, *aOR 14.4, 95%CI 5.6-36.9*

- Other previous uterine surgery

29% of affected women, 12% of control women, *aOR 3.4, 95%CI 1.3-8.9*

- Placenta praevia diagnosed antepartum

65% of affected women, 1% of control women, *aOR 65.0, 95%CI 16.6-255.0*

- IVF pregnancy

4% of affected women, 0.4% of control women, *aOR 32.1, 95%CI 2.0-509.2*

- Older maternal age in women without a previous CS delivery *aOR 1.3 for every one year increase in age, 95%CI 1.1-1.5*

Fitzpatrick KE et al. PLoS One. 2012;7(12):e52893.

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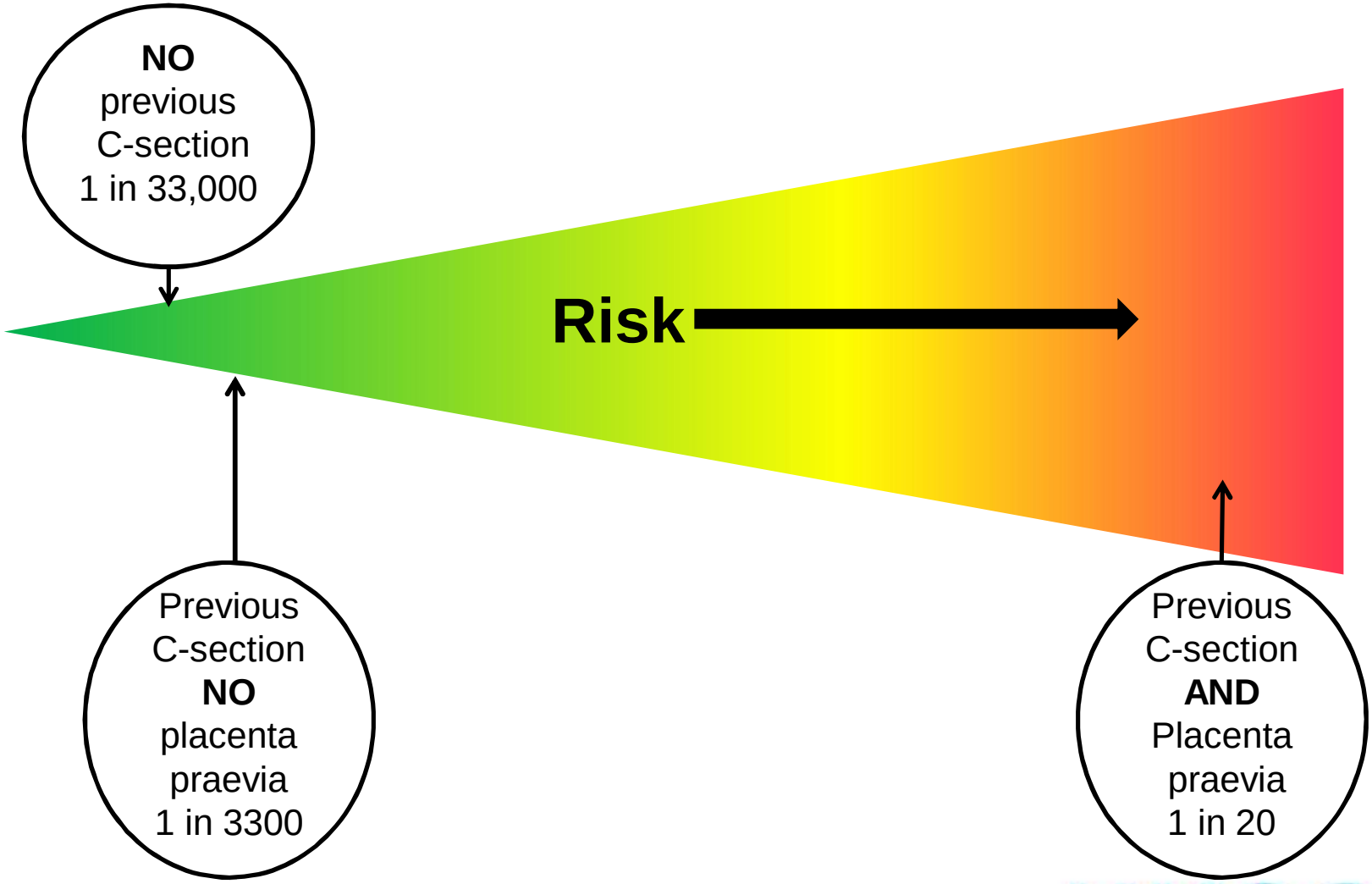
Absolute risk: Placenta accreta



Fitzpatrick KE et al. PLoS One. 2012;7(12):e52893.

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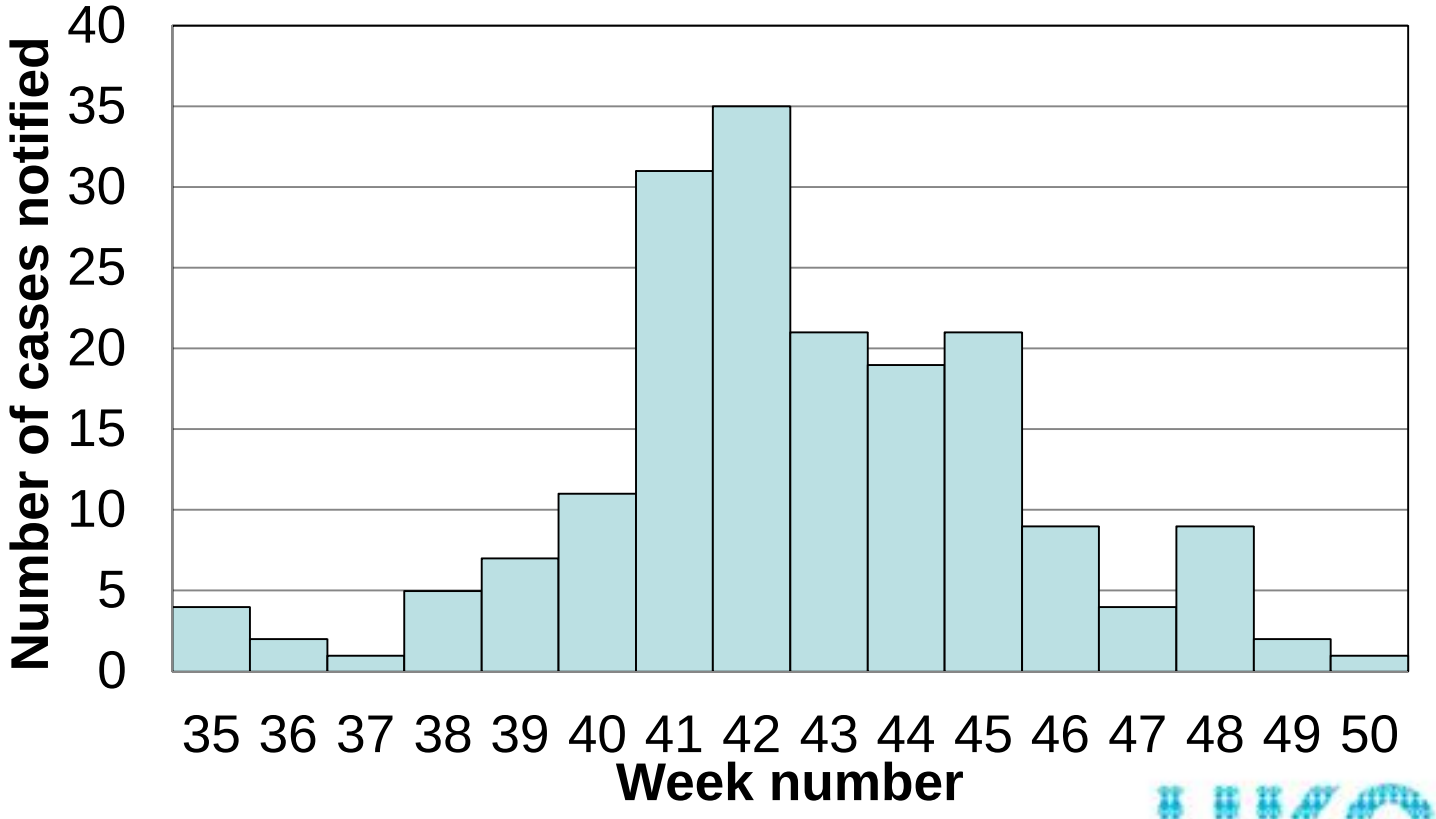
Public Health Response: H1N1v influenza in pregnancy

Pregnant women hospitalised with confirmed H1N1v



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Management ï Antivirals for H1N1

Treated within two days	Admitted to ITU (n,%)	Not admitted to ITU (n,%)	Adjusted Odds Ratio (95% CI)
Yes	12 (26)	119 (68)	0.1 (0.1-0.3)
No	34 (74)	55 (32)	1

Yates, L. et al 2010. Health Technol Assess (in press)

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Investigating disease progression - severe sepsis

- <24 hours between the first signs of systemic infection and severe sepsis:
  - 83% of cases and 85% of septic shock cases
- <48 hours between the first signs of systemic infection and severe sepsis:
  - 89% of cases and 95% of septic shock cases

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Investigating disease progression - Group A strep sepsis

Å50% <2 hours between the first signs of systemic infection and sepsis diagnosis

Å75% <9 hours between the first signs of systemic infection and sepsis diagnosis

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Intra-country comparisons - Eclampsia

	UK 2005 n=214	Netherlands 2004-6 n=222
Incidence (per 10,000 deliveries)	2.7 (2.4-3.1)	6.2 (5.4-7.1)
Maternal case fatality	0% (0-1.7)	1.4% (0.3-3.9)
Recurrent fits	25% (20-32)	24% (18-30)
Severe morbidity	10% (7-15)	42% (35-49)
Perinatal mortality	59/1000 (32-98)	82/1000 (42-144)

INOSS
The International Network of Obstetric Survey Systems

Key Messages - 1

- Overall there has been a statistically significant decrease in the maternal death rate between 2006-8 and 2009-12 in the UK.
- This decrease is predominantly due to a decrease in direct maternal deaths.
- There has been no significant change in the rate of indirect maternal death over the last 10 years, a time during which direct maternal deaths have halved. This needs action across a wide range of health services and not just maternity services.

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Key messages - 2

- The study of maternal morbidity using UKOSS complements information on maternal deaths
- UKOSS studies can be used to investigate incidence, risk factors, management and outcomes of individual conditions, and audit guidelines
- Many of these research questions cannot be answered using any other methodology
- Intra-country comparative and collaborative studies will add further value in the future

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