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MOTHERS' MORTALITY ASSOCIATED WITH CHILDBEARING

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CORE
Maternal mortality ratio (C6)

RECOMMENDED INDICATORS OF MORBIDITY NOT INCLUDED IN THIS REPORT
Maternal mortality by cause of death (R5)
Incidence of severe maternal morbidity (R6)
Incidence of tears to the perineum (R7)

Adverse maternal outcomes in pregnancy include mortality, near misses, severe morbidity, long-term sequelae, and minor morbidity. Each year more than 5 million women give birth in the EU. Another 2 million have a pregnancy that does not end in birth: spontaneous and induced abortions and both molar and ectopic pregnancies.

Maternal death is a major human tragedy; it is also, even in high-income countries, a key marker of health system performance. The global number of women who die in Europe during and because of pregnancy or childbirth ranges from 335 to 1000 according to the estimation method used. Such a range of variation is surprising for countries that all have quality birth registration systems; the discrepancies in national rates will be discussed later in the chapter.

Maternal mortality results from severe obstetric complications and conditions which mostly do not lead to death. This maternal morbidity is not adequately measured, however, because there is no international agreement about the definition of the conditions and also because the recording of these conditions is not standardised in routine hospital discharge databases, the main source of these data. Euro-Peristat contributes to on-going work to harmonise definitions for maternal morbidity to make it possible to measure it comparably in all countries. Risks of adverse maternal health outcomes rise with maternal age, BMI, and multiple pregnancy; all of these are becoming more common in the population of childbearing women in many countries.

In this core report, only the MMR (C6) is presented, including maternal deaths by age, and information about enhanced or routine maternal mortality data collection systems. The other three recommended indicators are: the causes of maternal death (R5), severe maternal morbidity, based on a working definition using ICD10 diagnostic codes, and perineal tears (R7), that is, third- and fourth-degree lacerations, which are associated with substantial morbidity and considered to reflect, in part, the quality of care.

C6 MATERNAL MORTALITY RATIO

JUSTIFICATION
Maternal mortality in Europe has decreased to a very low level, but healthy young women are still dying from obstetric causes, up to half of which are potentially avoidable. The maternal

mortality ratio (MMR) — the number of maternal deaths per 100 000 live births — is a proxy for the probability that a woman will die during a single pregnancy. Although this probability is low, maternal deaths in Europe are sentinel events that raise questions about the administration of effective care and the avoidance of substandard care.[1] They are also more frequent among disadvantaged and migrant women[2,3] and thus a marker of social inequalities in maternal health and of inequities of the healthcare system.

All countries participating in Euro-Peristat produce routine statistics from national civil registration and cause-of-death data systems on the frequency of maternal deaths. These have, however, been shown to be incomplete. Enhanced systems for reporting maternal deaths are necessary because all studies show that routine systems have a twofold problem: they underestimate the total numbers of maternal deaths by an order of magnitude of 25 to 70%, and they misallocate causes. Accurate information about both numbers is a prerequisite for robust public health recommendations.[4-6] Only a few European countries use enhanced systems, including formal systems of "Confidential Enquiry" or in the current WHO terminology, "Maternal Death Surveillance and Response".[7] These systems have especially strong traditions in France, the Netherlands, and the United Kingdom.

The most effective enhanced systems implement routine data linkage, in particular, linkage of deaths of women of reproductive age with births in the previous year, completed with direct information from the registrar about all cases not reported. The persistent lack of completeness for deaths during pregnancy, especially early pregnancy, implies that completeness requires multiple information channels, as used in the enhanced systems in France, Italy, the Netherlands, and the UK. Because of their multiple data linkage and miscarriage and abortion registries, it is reasonable to believe that the Nordic systems also provides a reliable rate.[8] Because of the importance of the data source in determining maternal mortality, Euro-Peristat requests information not only from routine systems but also from confidential enquiries and other enhanced systems where they exist.

Beyond improving statistics on maternal death, enhanced systems are used to study the circumstances that surround maternal mortality and the chain of events leading up to each death; these findings contribute to the prevention of future deaths. These investigations serve as a powerful tool for identifying weaknesses in the provision of care and recommending improvements to health policy makers, as in the recent UK recommendations for general practitioners.[9]

DEFINITION AND PRESENTATION OF INDICATOR

Maternal death is defined as the death of a woman while pregnant or within 42 days of the termination of pregnancy, regardless of the duration and site of the pregnancy, for any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes. The MMR is thus the number of all maternal deaths from direct and indirect obstetric causes per 100 000 live births. Our definition of maternal death is that published by WHO: a special chapter (10.3) of the 10th revision of the International Classification of Diseases (ICD-10) is devoted to the obstetric causes of death.[10] Because the number of deaths each year is so low in most countries, we used data covering a five-year period (2011 to 2015). Providers were asked for "routine" as well as "enhanced" data when these exist.

DATA SOURCES AND AVAILABILITY

Data came from routine and enhanced systems for recording maternal deaths. Routine systems are those most generally available in each member state or country; the data are generally extracted from national civil registration and cause-of-death data systems, in which deaths are coded according to ICD-10. All countries provided data from routine systems, with the exception of the Czech Republic and the Netherlands, which provided only data from enhanced system. Estonia, Ireland, France, Italy, and the United Kingdom provided data from systems with enhanced data collection as well as data from routine systems. Not all countries provided data for the years requested, ie, the five years between 2011 and 2015. Eight countries provided routine data for another period (6 of them from 2010-2014), and three used different time frames for data from enhanced systems.

METHODOLOGICAL ISSUES IN THE CALCULATION, REPORTING, AND INTERPRETATION OF THE INDICATOR

The first major difficulty in reporting maternal mortality is that maternal deaths remain generally under-reported,[11] so much so that WHO continues to consider that official routine statistics from high-income countries need to be weighted systematically by a factor of 1.5.[12] Because the WHO coefficient assumes the same level of under-reporting everywhere, we do not apply it. Instead, we provide data from enhanced systems where these exist, to illustrate the extent of under-reporting. In some cases, however, enhanced systems have wider inclusion criteria, especially for indirect and late maternal deaths. For example, data from the UK confidential enquiries system suggest that there is minimal under-reporting of direct maternal deaths in the routine system, but the confidential enquiry has a wider remit in investigating indirect and late maternal deaths. The same applies to the French confidential enquiry. Nonetheless, Euro-Peristat's previous research suggests that countries that establish enhanced systems for ascertaining maternal deaths may have less under-reporting of maternal deaths in routine data as well.[4]

A second difficulty comes from the small numbers recorded and the resulting statistical variation. To address the difficulties related to the low numbers of deaths, MMRs were calculated with data for the 5 years 2011-2015 and 95% confidence intervals are presented to illustrate the uncertainty arising from the small numbers of deaths in some countries. Even with data for 5 years, however, the numbers of deaths are still very low in the smallest countries. For example, no deaths were registered for the 2011-2015 period in Malta. Countries such as Iceland, Luxembourg, and Malta, all with fewer than 10 000 births per year, would need to collect maternal deaths over half a century or more to provide data as robust as those of the French or UK confidential enquiries. This would not be meaningful, because of the social and medical change that occur over such periods.

The last two difficulties pertain to possible non-inclusion and misclassification issues: unclear limits between indirect and direct deaths, and even between coincidental and maternal deaths, as in the case of suicide,[13,14] as well as possible prolonged resuscitation or suicide beyond 42 days, which would transform a maternal death into a late maternal death, not collected by Euro-Peristat.

RESULTS

The total number of maternal deaths officially recorded in routine systems over a five-year period varied from none in Malta, fewer than 5 in Cyprus, Estonia, Luxembourg, and Iceland to over 200 in France and the United Kingdom, as shown in Figure C6.1. The rates for the Czech Republic and the Netherlands in this graph are from enhanced systems as routine data were not provided.

Rates from enhanced systems, compared with rates from routine systems, are provided in Figure C6.2.

Based on data in routine systems, rates above 12 per 100 000 live births are reported by Hungary, Romania, and Latvia. Most countries report rates between 5 and 11.9 per 100 000 births, while Belgium, Germany, Greece, Poland, Spain, Slovakia, Switzerland, and the Nordic countries report rates below 5 per 100 000. The Nordic countries have a strong social and health support system and a managed migratory influx, so that their very low rates may reflect the true situation.[15] In other countries, exceptionally low rates may be related to ineffective ascertainment, especially in countries with a high rate of migrant mothers, specifically Belgium, Germany, Greece, and Spain.

Seven countries provided data from enhanced systems; five of them also provided routine system data (Figure C6.2). In all of these cases, maternal mortality calculated with data from enhanced systems was higher than that with data from routine systems, with Estonia's MMR rising from 4.3 to 12.9, France's from 6.4 to 8.9, and Italy's from 3.6 to 9.7. These examples show the extent to which MMR can be under-reported in routine reporting. Italy provides food for thought in this area: in the previous Euro-Peristat report, its rate was 2.1 per 100 000, and it is 3.1 per 100 000 using routine data in 2015. However, an enhanced system based on record linkage with hospital discharge records and birth certificates made it possible to improve ascertainment and shows that the true ratios are more than double those in routine systems.[16] The difference between routine and enhanced systems reflects the characteristics of these systems since some are more comprehensive in their methods for enhancing ascertainment. In the Czech Republic, for instance, because enhanced collection involves case identification through regular contact with all the maternity hospitals, it does not improve ascertainment of non-hospital deaths. These data are nonetheless considered of higher quality than routine data, which were considered too incomplete to be submitted for this report.

Changes over time between our last Euro-Peristat report covering data from 2006-2010 are heterogeneous and confidence intervals overlap in many countries. Changes over time may also reflect differences in ascertainment of maternal deaths between the periods. Reassuringly, there have been declines in several of the countries performing confidential enquiries, where data are more reliable: France from 9.1 to 8.9, the Netherlands from 7.7 to 5.1, and the UK from 11.4 to 8.5. This result is especially encouraging as maternal mortality has risen in the USA recently,[17] where debate continues about whether this increase is an artefact due to better ascertainment or a real effect associated with an increase in risk factors either in the childbearing population or related to the healthcare system.

Figure C6.4 presents MMRs by maternal age group. In view of the small numbers, we pooled the data from contributing countries and focused on three age groups: younger than 25 years, 25-34 years, and 35 years and older. This figure illustrates the association between maternal age and maternal mortality. The MMR for women aged 35 years or older is about twice as high as for the other age groups. Compared with results from the previous Euro-Peristat reports, however, this differential has declined. In the last French report on maternal deaths, the group at lowest risk was no longer women aged 20-24, but those 25-29.[18]
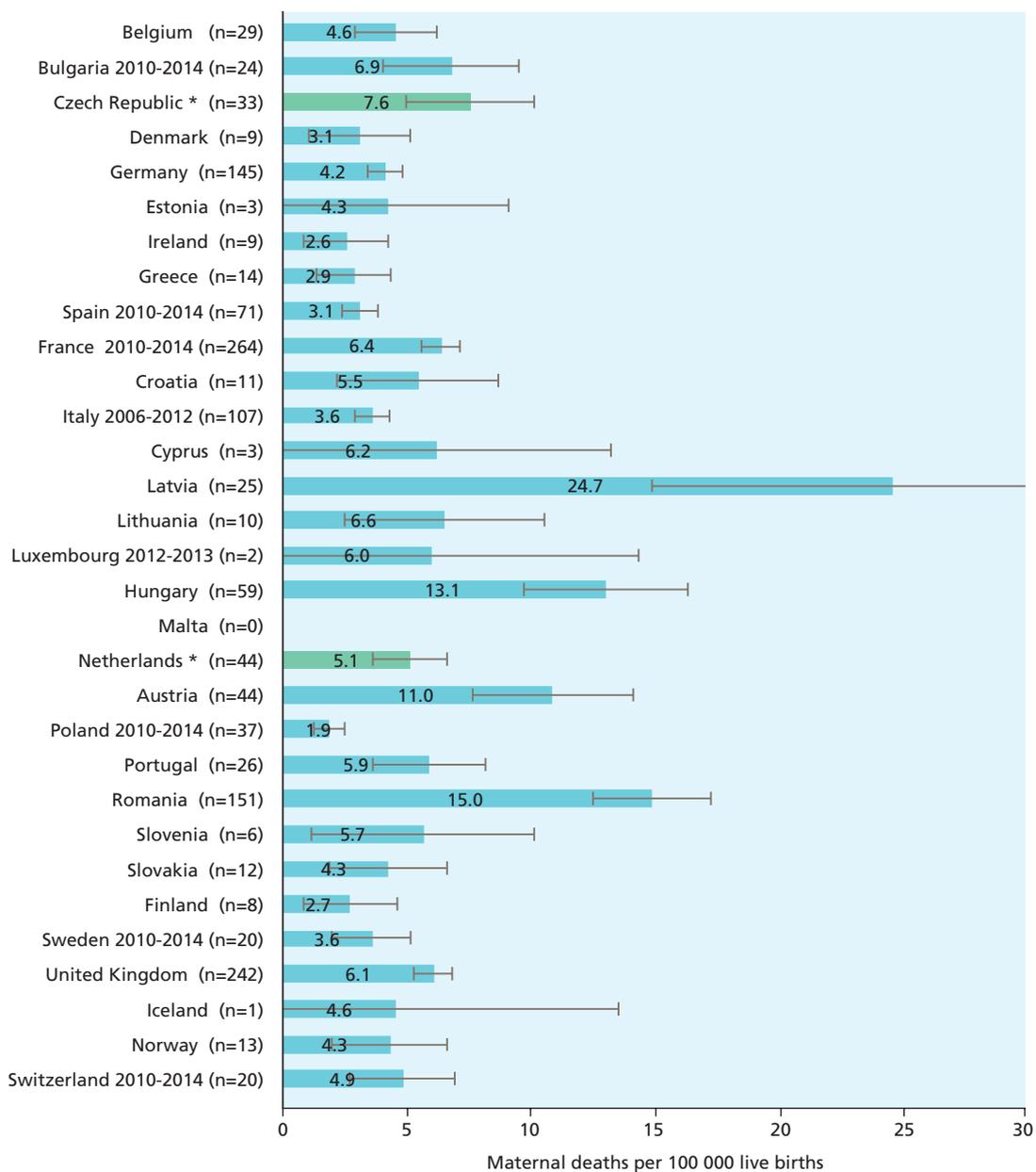
KEY POINTS

- The MMR is low (less than 10 per 100 000) in most European countries, but we believe it is often underestimated. There is good evidence that maternal deaths derived from routine statistical systems are under-reported, and this must be suspected particularly where ratios are very low.

- There is no agreement on the components of an "enhanced system", which may provide false reassurance about the completeness of ascertainment. Maternal death surveillance and response systems (record linkage, confidential enquiries, and targeted recommendations) are of paramount importance to obtain complete data on maternal deaths, as well as to make it possible to understand how these deaths happened and make recommendations to prevent the recurrence of those that were preventable.

- These systems exist in some European countries and are sometimes in place also for perinatal deaths and/or severe maternal morbidity. The generalisation of these systems is desirable as they make it possible to measure the true burden of maternal death and can thus inform policies to improve care.

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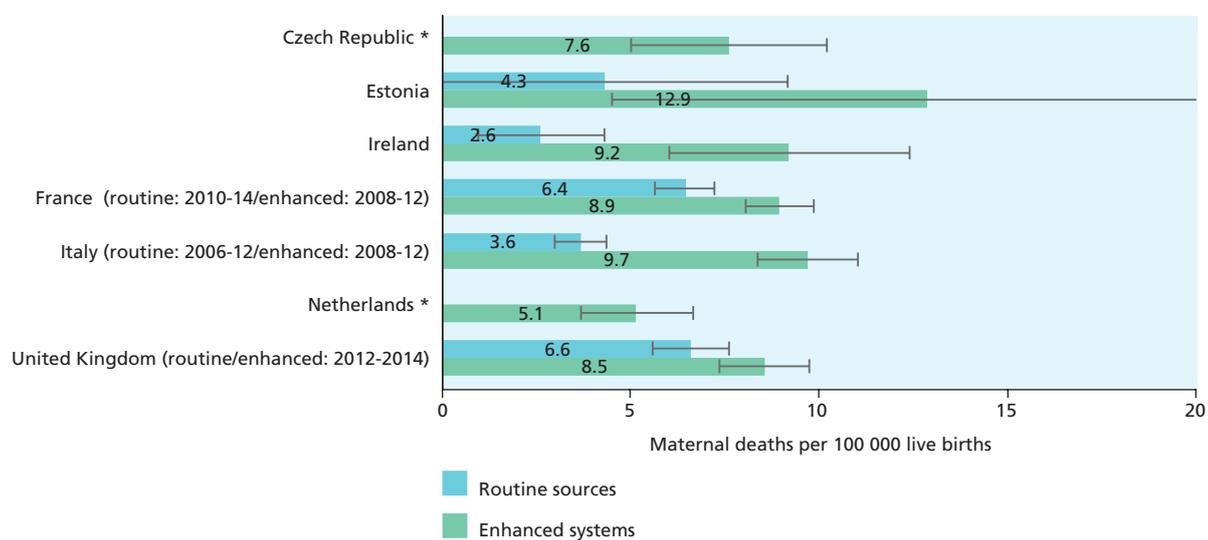
Figure C6.1.   Maternal mortality ratios with 95% confidence intervals, 2011-2015 (except where noted)

Country	Value
Belgium (n=29)	4.6
Bulgaria 2010-2014 (n=24)	6.9
Czech Republic * (n=33)	7.6
Denmark (n=9)	3.1
Germany (n=145)	4.2
Estonia (n=3)	4.3
Ireland (n=9)	2.6
Greece (n=14)	2.9
Spain 2010-2014 (n=71)	3.1
France 2010-2014 (n=264)	6.4
Croatia (n=11)	5.5
Italy 2006-2012 (n=107)	3.6
Cyprus (n=3)	6.2
Latvia (n=25)	24.7
Lithuania (n=10)	6.6
Luxembourg 2012-2013 (n=2)	6.0
Hungary (n=59)	13.1
Malta (n=0)	
Netherlands * (n=44)	5.1
Austria (n=44)	11.0
Poland 2010-2014 (n=37)	1.9
Portugal (n=26)	5.9
Romania (n=151)	15.0
Slovenia (n=6)	5.7
Slovakia (n=12)	4.3
Finland (n=8)	2.7
Sweden 2010-2014 (n=20)	3.6
United Kingdom (n=242)	6.1
Iceland (n=1)	4.6
Norway (n=13)	4.3
Switzerland 2010-2014 (n=20)	4.9

Maternal deaths per 100 000 live births

NOTE: Number of deaths in parentheses. *Data from enhanced system, routine system data not provided.

Figure C6.2   Maternal mortality ratios from routine statistics and from enhanced systems, 2011-2015 (except where noted)

Czech Republic * 7.6

Estonia 4.3 / 12.9

Ireland 2.6 / 9.2

France (routine: 2010-14/enhanced: 2008-12) 6.4 / 8.9

Italy (routine: 2006-12/enhanced: 2008-12) 3.6 / 9.7

Netherlands * 5.1

United Kingdom (routine/enhanced: 2012-2014) 6.6 / 8.5

Maternal deaths per 100 000 live births

■ Routine sources
■ Enhanced systems

NOTE: *Enhanced only reported. For the UK, routine MMR was recalculated to cover the same years as the enhanced system.

Figure C6.3   Changes in maternal mortality ratios from routine sources between 2006-2010 and 2011-2015

Maternal deaths per 100 000 live births
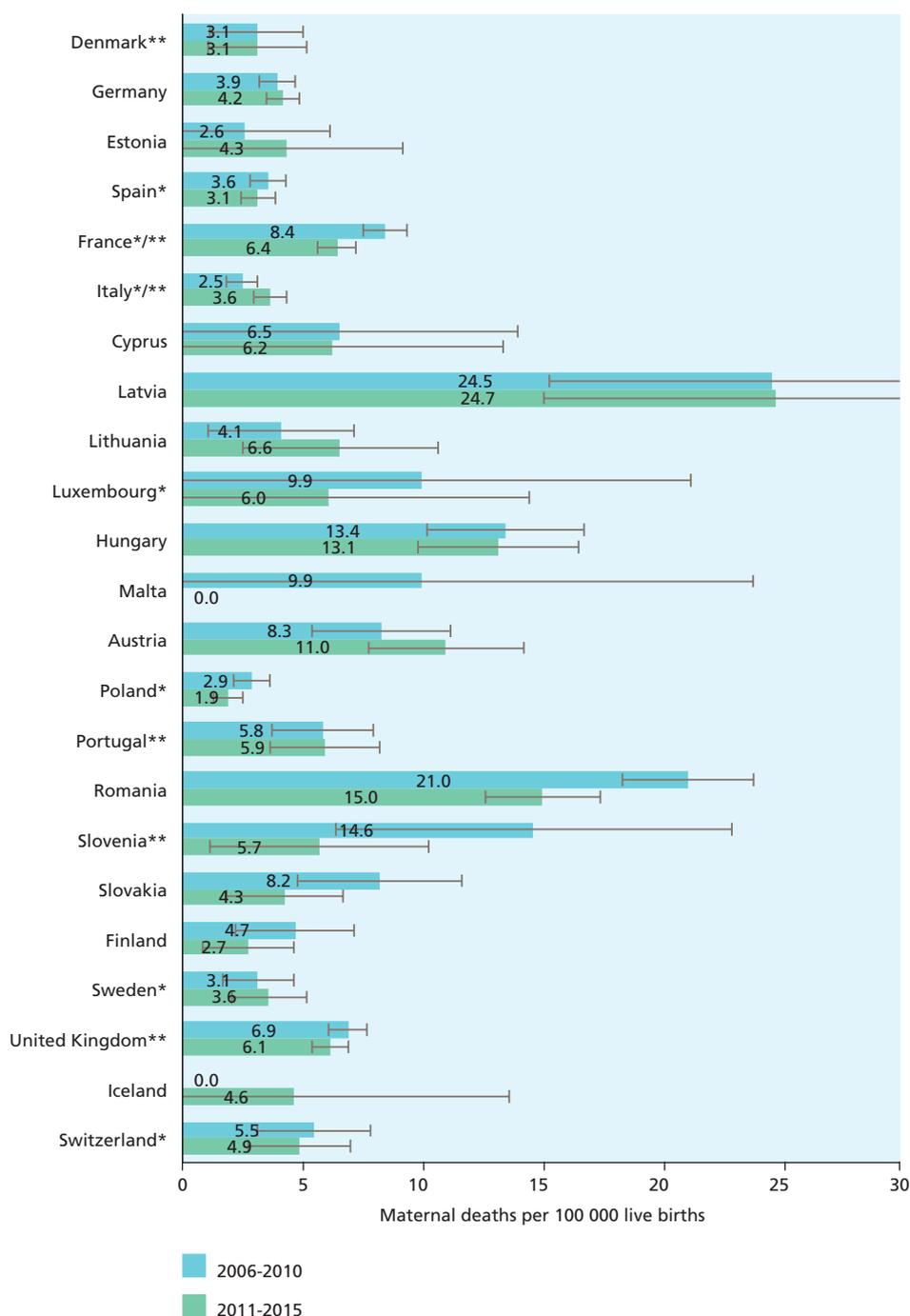
■ 2006-2010

■ 2011-2015

NOTE: Iceland had no maternal deaths in 2006-2010 and Malta none in 2011-2015.
* Second-period ratio data not from 2011-2015: Spain 2010-2014, France 2010-2014, Italy 2006-2012, Luxembourg 2012-2013, Poland 2010-2014, Sweden 2010-2014, Switzerland 2010-2014.
** First-period ratio data not from 2006-2010: Denmark 2005-2009, Italy 2006-2009, Slovenia 2006-2009, France 2005-2009, United Kingdom 2006-2008, Portugal 2003-2007.

Figure C6.4   Maternal mortality ratios by maternal age