

All Wales Perinatal Survey

<http://www.cf.ac.uk/medic/awps/>

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The All Wales Perinatal Survey (AWPS) was established in 1992 as a continuous, accurate, complete and timely surveillance of perinatal and infant mortality in Wales. It is based on deaths of babies from 20 weeks gestation to one year of age, whose mother is usually resident in Wales, or who die in a Welsh hospital. The survey continuously collects and reports on stillbirths in Wales annually.

The survey is funded by Welsh Government and is located within the Department of Child Health, Cardiff University, School of Medicine. The survey has in the past conducted several confidential enquiries working alongside the Centre for Maternal and Child Enquiries (CMACE) formerly Confidential Enquiry into Maternal and Child Health (CEMACH).

In this paper we present an overview of stillbirth data for Wales, focusing on trends, risk factors and causes of stillbirths.

Summary/Key messages

1. The stillbirth rate in Wales has remained between 4.5 and 5.0 per 1000 registrable births over the last 17 years.
2. This is in contrast to the neonatal mortality rate in Wales which has declined from 4.1 per 1,000 live births in 1999 to 2.9 per 1000 live births in 2005 and has remained around this rate for the last 5 years.
3. In the majority of cases the cause of stillbirth is not known.
4. Stillbirth rates in Wales remain higher than in other European countries.
5. Some differences may be due to different methods of case ascertainment and measuring, however there remains a need to understand why the rate in Wales has not decreased.
6. It is essential to investigate the rate of stillbirth in Wales including the reasons why the rates have not fallen. As an initial step we would like to propose a confidential enquiry focused on stillbirths, to gain insights into the main causes of stillbirth, to identify avoidable causes and to recommend improvements in clinical care and service provision. This will also enable improved dialogue between interested parties with a view to identifying areas that would require further investigation. The All Wales Perinatal Survey has run confidential enquiries in the past and is well placed to conduct such confidential enquiries in Wales.

Stillbirth data for Wales

We have used the UK definition of stillbirth which is late fetal death from 24 weeks gestation. The stillbirth rate in Wales in 2010 was 5.2 per 1000 births, which is similar to the 2009 rate and to the annual rate for the combined 3 years 2007-2009. The stillbirth rate in England in 2010 was 5.1 per 1,000 registrable births (ONS)¹, 4.9 per 1,000 registrable births in Scotland², and 4.1 per 1,000 registrable births in Northern Ireland³. These rates include late terminations. The stillbirth rate in Wales excluding late terminations in 2010 was 4.6 per 1,000 registrable births.

Figure 1 shows the trend in stillbirth rates since 1993 for Wales. The declining trend of recent years seems to have reached a plateau. Similar trends are observed for stillbirth rates in Welsh NHS regions and Health Boards (Table 1), which are also presented as funnel plots to facilitate comparison between Local Authority areas. (Fig 5)

Figure 2 shows the trend for neonatal mortality rate. The neonatal death rate for Wales has shown improvement and has been stable at around 3.0 per 1000 livebirths for the past 5 years. This is in contrast to the stillbirth rate which has not shown a similar trend.

Figures 3 and 4 show stillbirth rates for England and English regions for comparison with Welsh rates. These data are from the Office for National Statistics (ONS).

Within Europe data on stillbirths are available for 2004, collated in the European Perinatal Health Report⁴. Stillbirth rates (from 28 weeks gestation) ranged from 1.7 per 1,000 births in the Slovak Republic to 4.9 per 1,000 births in Latvia and France. However, differences in ascertainment and registration may contribute to some of this observed variation such that direct comparisons between countries may be inaccurate⁵. Within the UK the rate for stillbirths (from 28 weeks gestation) was 4.6 per 1,000 births in Scotland, 3.8 per 1,000 births in Northern Ireland and 4.1 per 1,000 births in Wales in 2004. Data on stillbirths using this definition were not available for England.

A recent report on stillbirth rates⁶ estimated there were 2.6 million stillbirths (at least 1000g birthweight or at least 28 completed weeks gestation) globally in 2009. Globally the stillbirth rate has declined by 14.5% from 22.1 per 1,000 births in 1995 to 18.9 per 1,000 births in 2009. The estimated rate for the UK using this definition was 3.4 per 1,000 total births. The rate for Wales using this definition was 3.9 per 1,000 births in 2009 and 4.0 per 1,000 births in 2010.

Figure 1

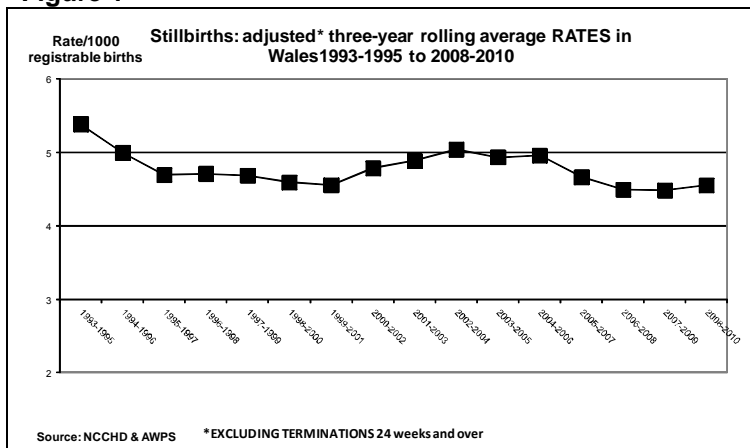


Figure 2

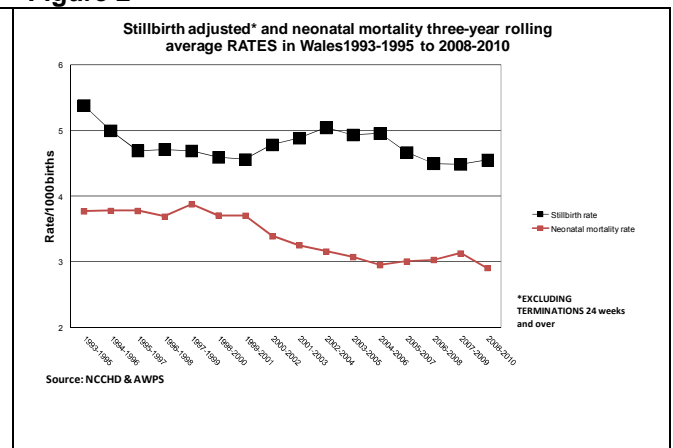
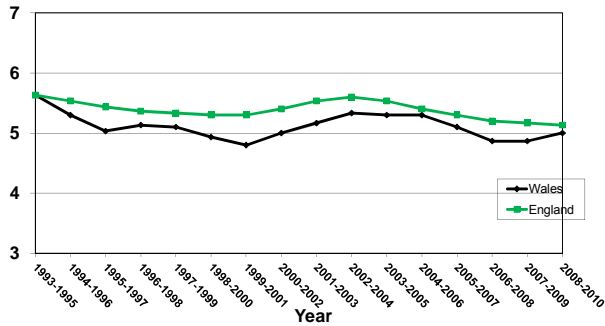


Figure 3

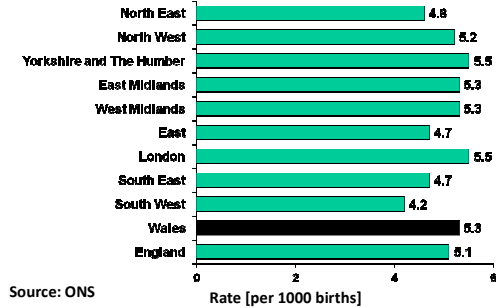
Stillbirth rates in England and Wales 1993-2010



Rate [per 1000 births]
Source: ONS

Figure 4

Stillbirth rate by English region and Wales 2010



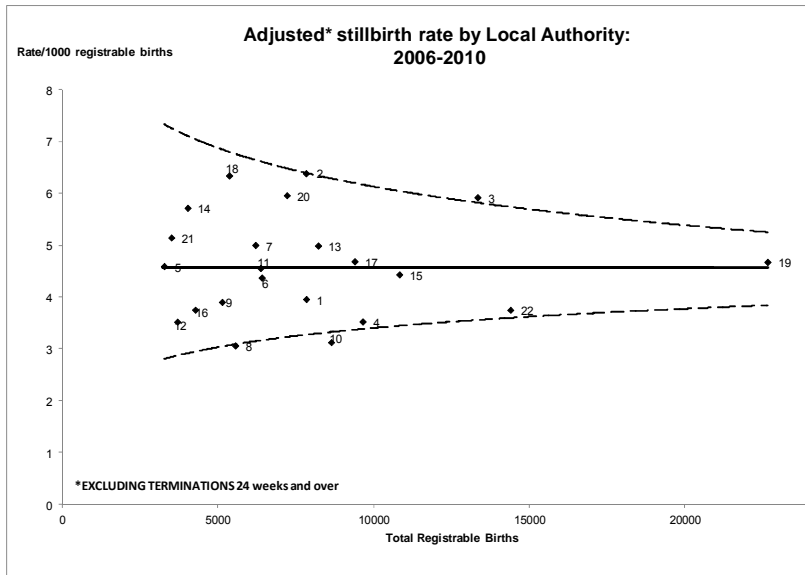
Source: ONS

Table 1 Stillbirths: adjusted* three-year rolling average RATES by Local Authority and NHS Region 1999-2001 to 2008-2010 and 2010 with 95% CI

Health Board	Local Authority and NHS Region	1999-2001	2000-2002	2001-2003	2002-2004	2003-2005	2004-2006	2005-2007	2006-2008	2007-2009	2008-2010	2010	95% CI
		2001	2002	2003	2004	2005	2006	2007	2008	2009	2010		
Abertawe Bro Morgannwg University Health Board	Bridgend	4.71	4.41	4.67	4.81	5.56	5.30	4.14	3.02	1.93	4.62	9.0	(5.5 14.9)
	Neath Port Talbot	3.38	3.85	5.02	4.12	3.69	4.66	6.36	6.49	5.78	5.87	6.8	(3.8 12.1)
Hywel Dda Health Board	Swansea	5.29	5.49	4.49	4.14	3.92	5.43	6.14	5.93	5.78	5.15	5.7	(3.5 9.2)
	Carmarthenshire	3.29	3.53	2.77	3.43	4.15	4.59	5.01	4.14	4.14	3.10	1.5	(0.5 4.5)
Powys Teaching Health Board	Ceredigion	5.60	5.19	3.50	4.48	3.86	3.33	3.21	3.73	6.15	5.51	4.1	(1.4 12.0)
	Pembrokeshire	3.78	2.97	4.08	4.93	4.79	4.08	3.99	4.98	4.98	3.90	2.3	(0.8 6.8)
Mid and West Wales	Powys	4.67	4.73	5.81	6.65	6.47	6.06	4.30	3.72	5.25	5.66	3.4	(1.3 8.6)
	Conwy	3.71	5.42	4.58	3.89	2.90	3.11	3.74	3.62	3.64	2.38	1.8	(0.5 6.4)
Betsi Cadwaladr University Health Board	Denbighshire	5.03	5.12	6.12	6.69	6.20	5.14	3.05	2.61	2.91	4.79	8.6	(4.5 16.2)
	Flintshire	4.91	5.89	4.47	3.91	3.03	3.56	4.13	3.49	3.46	2.31	1.1	(0.3 4.2)
	Gwynedd	3.02	2.86	4.12	4.35	4.73	3.72	3.42	3.94	4.75	5.77	6.4	(3.2 12.6)
	Isle of Anglesey	4.99	5.41	5.46	5.28	4.59	5.04	3.84	3.26	3.60	3.52	2.5	(0.7 9.1)
	Wrexham	6.52	6.73	5.28	4.09	4.93	6.11	6.90	5.37	5.20	4.09	3.0	(1.3 6.9)
North Wales	4.74	5.31	4.91	4.53	4.29	4.41	4.37	3.85	4.03	3.75	3.7	(2.5 5.3)	
Aneurin Bevan Health Board	Blaenau Gwent	4.92	5.22	4.28	6.61	7.78	8.37	7.41	4.97	4.94	5.25	8.6	(4.2 17.6)
	Caerphilly	4.44	4.70	5.21	5.74	5.62	5.40	5.13	4.36	4.05	4.08	4.4	(2.4 8.1)
	Monmouthshire	2.16	2.56	3.28	4.29	3.87	3.95	3.23	3.86	4.30	4.22	3.4	(1.2 10.1)
	Newport	3.92	4.59	6.13	6.50	6.37	6.22	4.80	5.10	3.66	4.58	5.1	(2.8 9.3)
Cardiff and Vale University Health Board	Torfaen	3.75	4.08	5.52	6.07	5.29	5.96	4.97	5.99	5.95	6.47	6.4	(3.1 13.1)
	Cardiff	5.64	5.10	4.00	4.66	5.27	5.38	4.83	4.84	4.39	4.77	5.2	(3.5 7.7)
Cwm Taf Health Board	The Vale of Glamorgan	4.75	5.44	6.75	6.05	5.16	3.57	3.91	5.12	7.95	7.51	3.5	(1.5 8.1)
	Merthyr Tydfil	4.21	7.12	7.07	6.92	4.15	5.08	4.44	5.10	5.22	5.23	5.7	(2.2 14.5)
South East Wales	Rhondda Cynon Taff	4.83	4.76	6.11	5.91	5.77	4.75	3.98	4.08	3.60	4.00	4.3	(2.5 7.4)
	South East Wales	4.60	4.83	5.25	5.65	5.52	5.30	4.67	4.74	4.60	4.89	5.0	(4.0 6.1)
WALES		4.56	4.79	4.89	5.05	4.94	4.96	4.67	4.50	4.49	4.55	4.6	(4.0 5.4)

*excludes terminations 24 weeks and over

Figure 5

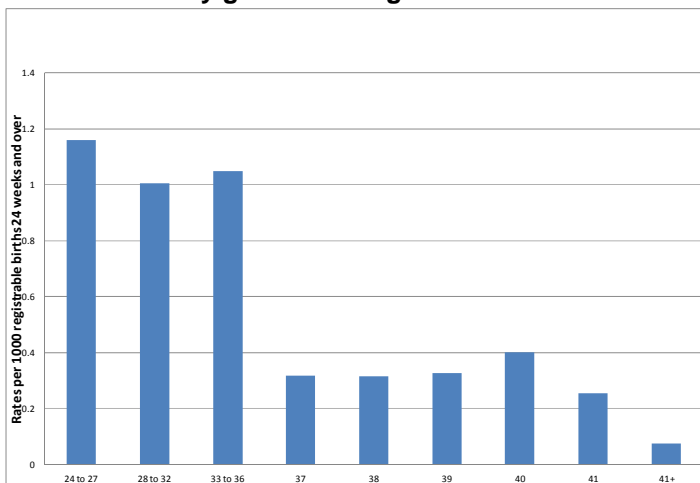


- | | |
|--------------------------|---|
| 1 Bridgend | Abertawe Bro Morganwg University He |
| 2 Neath Port Talbot | Abertawe Bro Morganwg University He |
| 3 Swansea | Abertawe Bro Morganwg University He |
| 4 Carmarthenshire | Hywel Dda Health Board |
| 5 Ceredigion | Hywel Dda Health Board |
| 6 Pembrokeshire | Hywel Dda Health Board |
| 7 Powys | Powys Teaching Health Board |
| 8 Conwy | Betsi Cadwaladr University Health Boa |
| 9 Denbighshire | Betsi Cadwaladr University Health Boa |
| 10 Flintshire | Betsi Cadwaladr University Health Boa |
| 11 Gwynedd | Betsi Cadwaladr University Health Boa |
| 12 Isle of Anglesey | Betsi Cadwaladr University Health Boa |
| 13 Wrexham | Betsi Cadwaladr University Health Boa |
| 14 Blaenau Gwent | Aneurin Bevan Health Board |
| 15 Caerphilly | Aneurin Bevan Health Board |
| 16 Monmouthshire | Aneurin Bevan Health Board |
| 17 Newport | Aneurin Bevan Health Board |
| 18 Torfaen | Aneurin Bevan Health Board |
| 19 Cardiff | Cardiff and Vale University Health Boar |
| 20 The Vale of Glamorgan | Cardiff and Vale University Health Boar |
| 21 Merthyr Tydfil | Cwm Taf Health Board |
| 22 Rhondda Cynon Taff | Cwm Taf Health Board |

We compare mortality rates between Local Authorities using funnel plots. These funnel plots show the mortality rate for each Local Authority plotted against the number of births in each. The average mortality rate in Wales is indicated by the solid horizontal line. The curved lines represent limits within which 95% of results should lie if the average rate in Wales applied to all. Rates above or below these dashed lines are considered to be statistically significantly different from the average rate. The plots are calculated using the Wilson score interval. This method is generally regarded as an improvement over the normal approximation interval^{7,8} and has the advantage that the lower line of the funnel plot cannot reach implausible values i.e. below zero. These funnel plots are calculated assuming that the populations of women giving birth are directly comparable between Local Authority. Therefore they do not allow for any heterogeneity (for example differences in case mix) between Local Authority. Hence there may be plausible reasons for the significantly higher or lower rates in the Local Authorities that are identified as outliers.

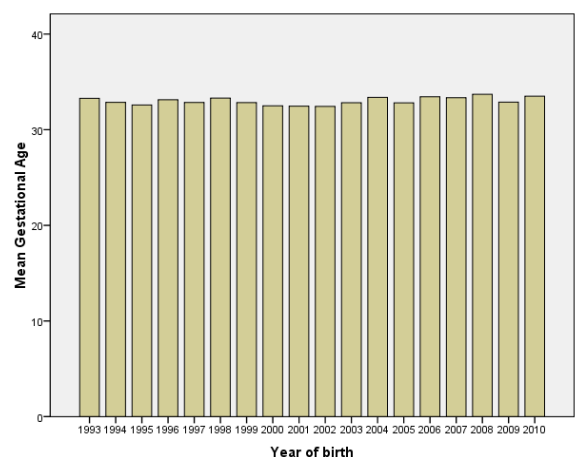
Figure 6 below shows the rate of stillbirth by gestational age at birth from 1993 to 2010. Rates are higher for babies born before 37 weeks gestation (1 to 1.2 per 1,000) compared to 0.3 per 1,000 for babies born at 37 weeks or later. The mean gestational age of stillbirths is 33 weeks, and this has not changed over time (Figure 7). Ten percent of babies born at 37 weeks or later are small for gestational age (have low birth weight). The stillbirth rate for these babies is 4.9 per 1,000 compared to 1.4 per 1,000 for babies who have birth weight appropriate for gestational age.

Figure 6
Stillbirth* rate by gestational age – 1993 to 2010



*excludes terminations

Figure 7
Stillbirths* 1993 to 2010 by mean gestational age

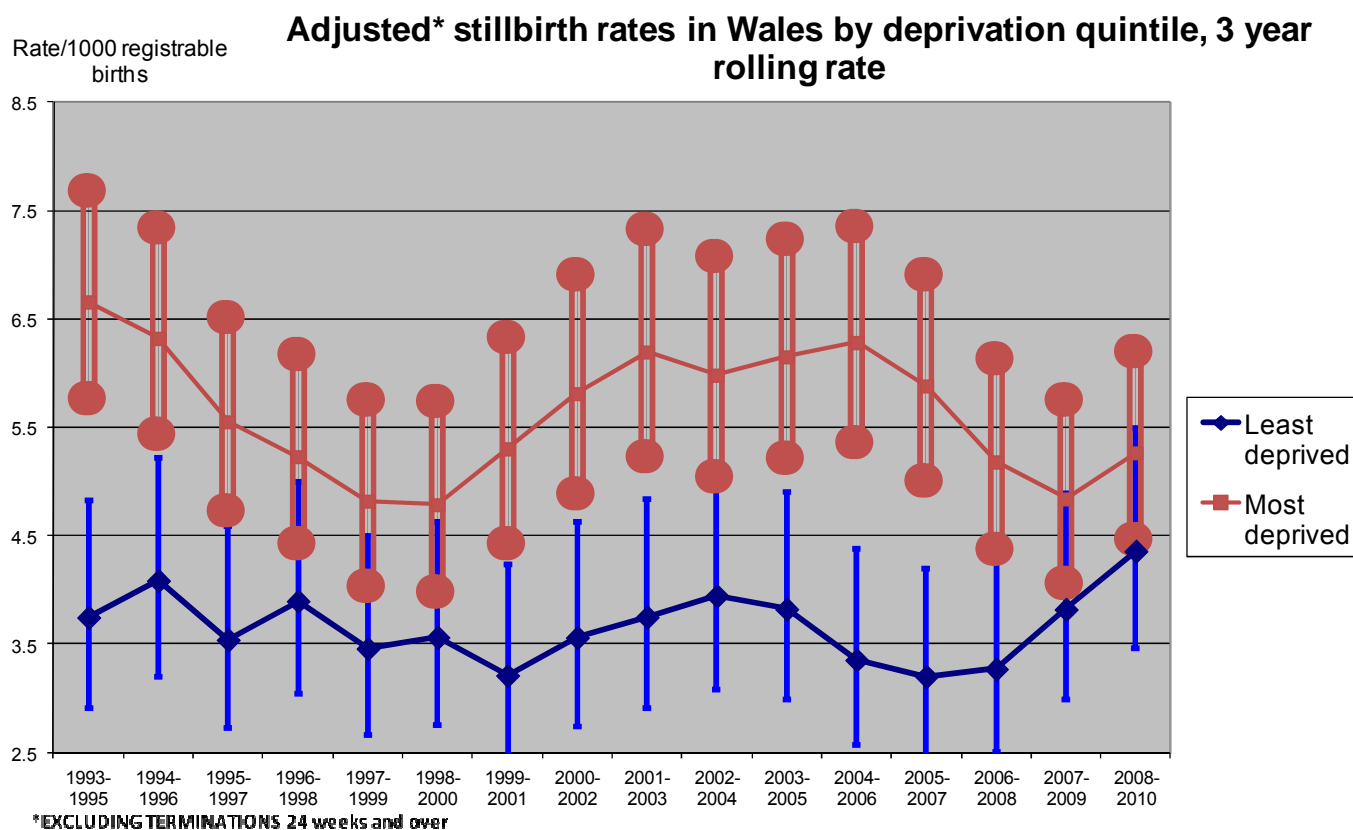


*excludes terminations

Social Deprivation Quintile

Within Wales, stillbirth rates are persistently higher in the most deprived quintile of social deprivation measured using the Welsh Index of Multiple Deprivation (WIMD_2008), although rates over the last decade suggest a slight narrowing of the gap between the most deprived and least deprived quintiles (Figure 4). Similar trends have been observed in England⁹.

Figure 8



The chart shows the rates in the highest and lowest quintiles of the population as given by the Welsh Index of Multiple Deprivation (WIMD_2008). The vertical lines show the 95% CI at each point. Cases were allocated to the appropriate quintile of deprivation based on mother's residence and LSOA. These scores were based on the mothers, not babies, and for multiple pregnancies only the first born babies were assigned a deprivation score, to avoid double counting.

Risk factors for stillbirth

A systematic review of major risk factors for stillbirth in high income countries has identified maternal overweight and obesity (body-mass index $>25 \text{ kg/m}^2$), advanced maternal age and maternal smoking as the highest ranking modifiable risk factors¹⁰. In the UK smoking accounts for 7% of all stillbirths but it is estimated that in disadvantaged populations maternal smoking contributes to up to 20% of stillbirths. These findings highlight the importance of public health initiatives to tackle smoking and obesity in women of reproductive age. Data from the Infant Feeding Survey for Wales 2010¹¹ show that 16% of pregnant women smoke throughout pregnancy. Data published in the CMACE report on maternal obesity shows that Wales has the highest prevalence of obesity in pregnancy in the UK at 6.5%, compared with 5.5% in Scotland, 4.9% in England and 5.3% in Northern Ireland¹².

Cause of death in stillbirths

Classification systems for stillbirths are used to give as much insight as possible into the underlying cause of death or events leading up to death, in order to explore any trends or variation in causes of death and identify areas that can be addressed.

We present stillbirths (excluding late terminations) by the Aberdeen classification (also known as the 'Obstetric' classification) (Tables 2 and 3). These systems allow for the classification of deaths according to the clinical factors that preceded death, for example preterm labour, congenital abnormalities and fetal growth restriction. However the limitation of this system is that a large proportion of stillbirths are classified as 'unexplained', 61.7% of stillbirths in 2010. A new classification that takes account of both obstetric and fetal factors was proposed and adapted for use by CMACE in 2008¹³. This year we also present data on cause of death in stillbirths using this CMACE classification (Table 4 and Figure 9). Using the CMACE classification only 41.7% of stillbirths were 'unexplained'.

Ante-partum haemorrhage and congenital anomalies remain leading causes of stillbirth. Screening and monitoring in pregnancy are used to identify high risk pregnancies to provide appropriate clinical management. However a recent systematic review of screening and monitoring interventions in pregnancy has reported there is limited evidence for the impact of these interventions on stillbirth¹⁴. Screening and interventions to reduce antepartum stillbirth as a result of placental dysfunction has been identified as a priority for future research¹⁵⁻¹⁷.

Table 2 Aberdeen Classification* by Welsh NHS Region 2006-2010 – Stillbirths**

Aberdeen Classification 2006-2010	MW n=268	N n=147	SE n=386	WALES n=801
Antepartum haemorrhage (APH)	9.7%	10.9%	10.4%	10.2%
Congenital anomaly	7.1%	3.4%	6.7%	6.2%
Maternal Disorder	8.6%	7.5%	6.0%	7.1%
Mechanical	9.3%	4.1%	4.4%	6.0%
Miscellaneous	4.1%	6.1%	6.5%	5.6%
Pre-eclampsia	1.9%	4.1%	2.1%	2.4%
Unclassifiable	0.4%	2.0%	0.5%	0.7%
Unexplained	59.0%	61.9%	63.5%	61.7%

*For definitions see Appendix E in AWPS annual report^A

**excludes 91 terminations of pregnancy from 24 weeks gestation (87 congenital anomalies, 2 maternal disorder, 2 miscellaneous)

Table 3 Aberdeen Classification* 3 year rolling rates – Stillbirths**

	1993-1995	1994-1996	1995-1997	1996-1998	1997-1999	1998-2000	1999-2001	2000-2002	2001-2003	2002-2004	2003-2005	2004-2006	2005-2007	2006-2008	2007-2009	2008-2010
	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%	%
Antepartum haemorrhage	17.5	17.4	19.7	20.0	20.7	17.0	15.9	14.4	15.7	17.6	16.8	16.3	12.1	9.6	7.0	9.0
Congenital anomaly	3.1	3.0	3.7	4.7	6.3	7.4	10.0	9.1	8.9	6.8	7.1	6.5	7.0	6.2	6.3	6.1
Iso-immunisation	0.3	0.2	0.2	0.0	0.0	0.0	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maternal Disorder	7.3	7.6	9.6	9.6	8.7	8.1	6.3	6.4	6.3	8.9	8.2	7.1	5.9	6.8	7.4	7.4
Mechanical	3.1	4.0	4.3	4.1	2.3	2.0	2.1	3.2	3.6	3.2	2.5	4.1	5.5	6.4	5.1	5.3
Miscellaneous	4.7	4.0	4.9	4.9	5.3	5.1	4.0	2.5	2.9	2.5	2.9	1.6	2.1	3.0	6.3	8.0
Pre-eclampsia	5.5	6.4	7.7	8.0	6.6	4.5	3.5	4.8	5.6	6.4	5.5	4.9	4.7	3.4	2.5	1.2
Unclassifiable	0.2	0.0	0.0	0.0	0.4	0.7	0.9	0.7	0.4	0.4	0.4	0.4	0.4	0.6	1.3	1.0
Unexplained	58.2	57.4	50.0	48.7	49.7	55.3	57.0	58.7	56.4	54.2	56.5	59.1	62.4	64.0	64.1	61.9
	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n	n
Total	577	528	492	489	473	447	428	438	447	472	476	491	473	470	474	488

*For definitions see Appendix E in AWPS annual report^A

**excludes terminations of pregnancy from 24 weeks gestation

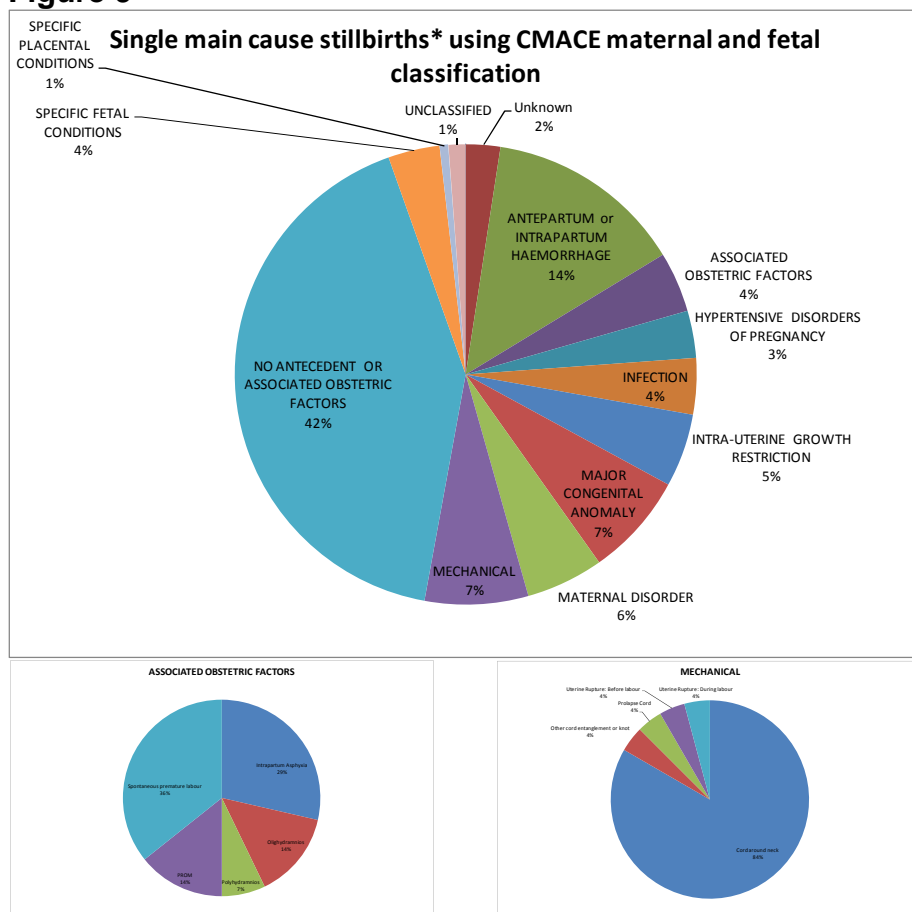
Table 4 CMACE classifications* for stillbirths by Welsh NHS Region 2009-2010**

<i>Single main cause stillbirths using CMACE maternal and fetal classification 2009-2010</i>	<i>MW n=113</i>	<i>N n=61</i>	<i>SE n=157</i>	<i>WALES n=331</i>
Unknown	2.7%	1.6%	2.5%	2.4%
ANTEPARTUM or INTRAPARTUM HAEMORRHAGE	15.0%	14.8%	12.7%	13.9%
ASSOCIATED OBSTETRIC FACTORS	6.2%	0.0%	4.5%	4.2%
HYPERTENSIVE DISORDERS OF PREGNANCY	2.7%	4.9%	3.2%	3.3%
INFECTION	3.5%	9.8%	1.9%	3.9%
INTRA-UTERINE GROWTH RESTRICTION	4.4%	3.3%	6.4%	5.1%
MAJOR CONGENITAL ANOMALY	8.0%	6.6%	7.0%	7.3%
MATERNAL DISORDER	4.4%	0.0%	8.3%	5.4%
MECHANICAL	10.6%	8.2%	4.5%	7.3%
NO ANTECEDENT OR ASSOCIATED OBSTETRIC FACTORS	38.1%	42.6%	43.9%	41.7%
SPECIFIC FETAL CONDITIONS	2.7%	4.9%	3.8%	3.6%
SPECIFIC PLACENTAL CONDITIONS	0.9%	0.0%	0.6%	0.6%
UNCLASSIFIED	0.9%	3.3%	0.6%	1.2%

*For definitions see Appendix E in AWPS annual report[^]

**excludes 41 terminations of pregnancy from 24 weeks gestation, all congenital anomalies (6 Cardiovascular System, 13 Central Nervous System, 8 Chromosomal Disorders, 8 Multiple Anomalies, 3 Musculo-Skeletal System, 1 Other major congenital anomaly, 2 Urinary Tract)

Figure 9



*excludes 41 terminations of pregnancy from 24 weeks gestation, all congenital anomalies (6 Cardiovascular System, 13 Central Nervous System, 8 Chromosomal Disorders, 8 Multiple Anomalies, 3 Musculo-Skeletal System, 1 Other major congenital anomaly, 2 Urinary Tract)

The way forward

A detailed study of stillbirths is required if we are to understand the reasons for stillbirth and identify modifiable risk factors that can be addressed to prevent them from occurring. A confidential enquiry focused on stillbirths would enable us to investigate stillbirths, to establish whether anything could have been done to prevent them through better clinical care. This process will allow the details of each stillbirth to be reviewed by a team of multidisciplinary experts (obstetricians, midwives, public health professionals and pathologists) with the aim of gaining insights into the main causes of stillbirth, to identify avoidable causes and to recommend improvements in clinical care and service provision. A confidential enquiry process will provide a mechanism for understanding why the stillbirth rate in Wales has not decreased. The All Wales Perinatal Survey has run confidential enquiries in the past and is well placed to take this forward in Wales.

^The data collected by The All Wales Perinatal Survey are presented in an Annual report, printed as hard copy and also available online as a PDF via the website. This report is distributed to NHS Trusts, LHBs, Health Authorities, Academic Staff, Libraries, Universities. <http://www.cf.ac.uk/medic/awps/>

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