Stillbirths, Infant Deaths and Congenital Anomalies

West Midlands 2003-2007

(Chapter 14)

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CHAPTER FOURTEEN: STILLBIRTHS, INFANT DEATHS AND CONGENITAL ANOMALIES, WEST MIDLANDS 2003 – 2007

14.1 Introduction

In the previous chapter (13), we presented stillbirth and infant mortality rates from all causes as well as 'corrected' rates, which exclude congenital anomalies and neonatal deaths at pre-viable gestations to allow comparison of rates between different populations.

This chapter examines lethal congenital anomalies in the West Midlands, and the contribution they make to stillbirths and infant deaths. We present overall rates, for the last five years, for each PCT in the Region, stratified for the 6 main congenital anomaly categories. We then focus on the largest category, chromosomal anomalies, represented mainly by trisomies 21 (Down's syndrome), 18 (Edwards'), and 13 (Patau).

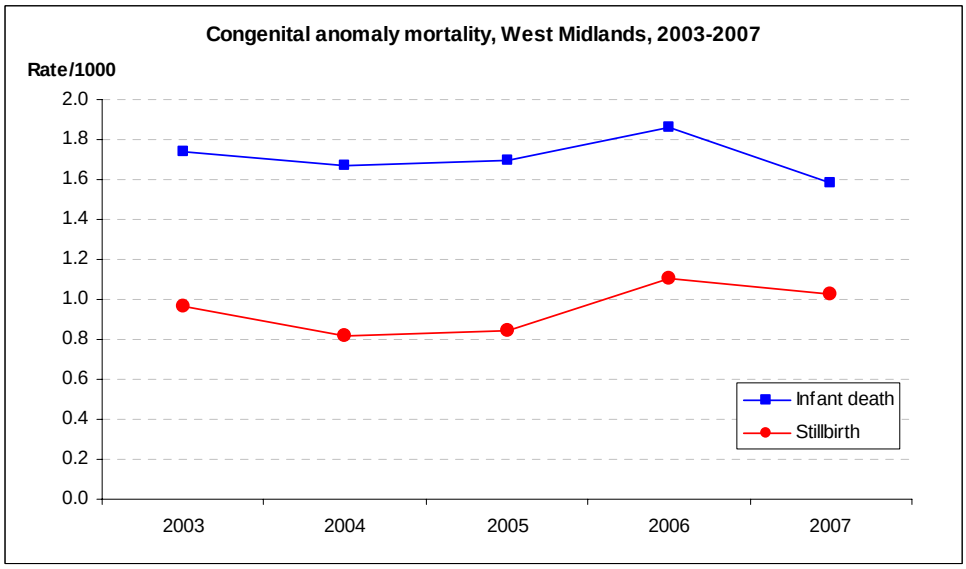
The information presented is obtained from the West Midlands Congenital Anomaly Register (WMCAR), which collects information from multiple sources in the Region, including antenatal ultrasound, laboratories, pathology departments, and delivery units. The Perinatal Institute maintains WMCAR together with registers of fetal losses and perinatal deaths, using these different sources to cross-validate the number of infants with lethal fetal anomalies. All anomalies are coded using the International Classification of Disease version 10 (ICD 10).

Further analysis of WM congenital anomalies & subgroups, and their association with consanguinity and other factors, will be possible with the recently commenced collection of the WM maternity dataset.

14.2 Mortality from Congenital Anomalies

As shown in the preceding chapter, 16.7% of stillbirths and 26.8% of infant deaths are due to congenital anomalies (Chapter 13, Figures 13.5 & 13.7).

Figure 14.1: Recent trend for stillbirths and infant deaths associated with congenital anomalies



Congenital anomaly related deaths are grouped into six categories, according to the Fetal and Neonatal classification:

Table 14.1: Congenital anomaly - major categories (fetal & neonatal classification)

	Category	Examples
1	Chromosomal defect	Down's syndrome (trisomy 21)
2	Inborn error of metabolism	Cystic fibrosis
3	Neural tube effect	Spina bifida
4	Congenital heart defect	Hypoplastic left heart syndrome
5	Renal abnormality	Renal agenesis
6	Other/ multiple malformations	Musculoskeletal disorders, central nervous system malformations; multiple malformations (syndromic/non-syndromic)

Figure 14.2: Stillbirths with major congenital anomalies, West Midlands, 2003-2007

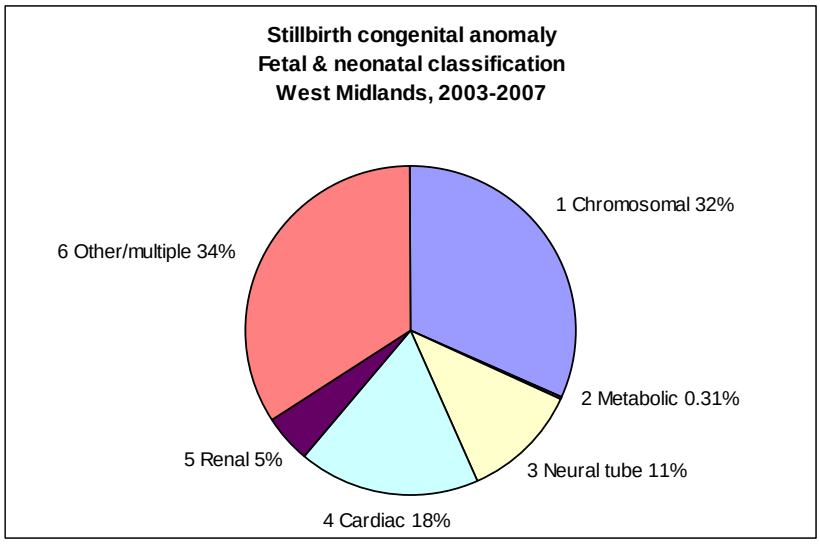
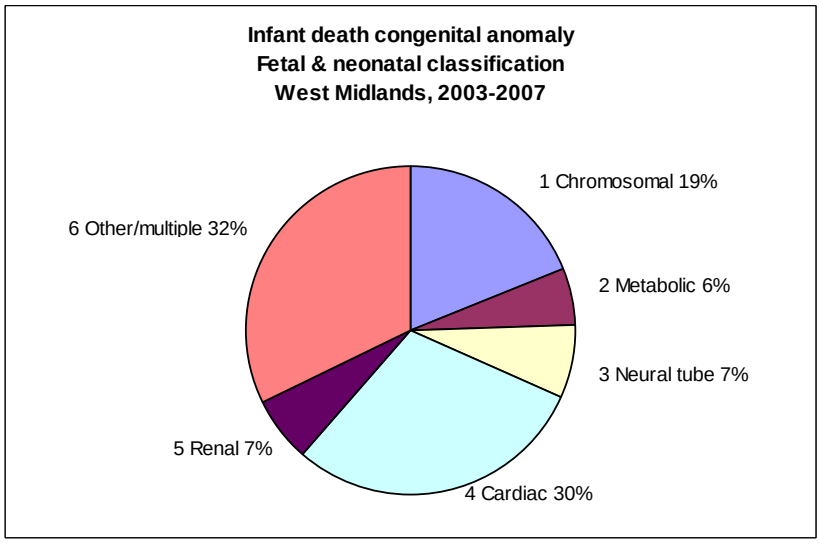


Figure 14.3: Infant deaths with major congenital anomalies, West Midlands, 2003-2007



In Tables 14.2 and 14.3, stillbirths and infant deaths due to congenital anomalies are presented for West Midlands PCTs by overall rate and within the six main anomaly categories (Table 14.1)

Table 14.2: Stillbirths due to major congenital anomaly groups, WM PCTs 2003-2007

PCT	Births 2003-07	Cong anom Deaths	Rate /1,000	Fetal/Neonatal anomaly categories*					
				1	2	3	4	5	6
Birmingham East & North	31,780	51	1.60	16	0	6	4	2	23
Coventry	20,338	14	0.69	3	0	1	4	1	5
Dudley	17,648	15	0.85	0	0	3	5	0	7
Heart of Birmingham	27,584	40	1.45	13	0	4	8	5	10
Herefordshire	8,579	6	0.70	3	0	1	0	0	2
North Staffordshire	10,152	6	0.59	3	0	0	0	0	3
Sandwell	20,935	22	1.05	4	1	4	2	1	10
Shropshire	14,057	5	0.36	1	0	0	2	0	2
Solihull	10,375	3	0.29	2	0	0	0	0	1
South Birmingham	21,445	25	1.17	9	0	1	3	1	11
South Staffordshire	32,682	27	0.83	11	0	4	6	0	6
Stoke on Trent	16,827	19	1.13	4	0	4	2	2	7
Telford & Wrekin	10,499	8	0.76	4	0	2	1	0	1
Walsall Teaching	17,404	11	0.63	2	0	1	2	0	6
Warwickshire	28,872	31	1.07	10	0	2	10	2	7
Wolverhampton	15,883	13	0.82	5	0	1	3	0	4
Worcestershire	30,193	23	0.76	11	0	2	5	1	4
WEST MIDLANDS	335,253	319	0.95	101	1	36	57	15	109

* Categories as listed in Table 14.1

Table 14.3: Infant deaths due to major congenital anomaly groups by WM PCTs, 2003-2007

PCT	Births 2003-07	Cong anom Deaths	Rate /1,000	Fetal/Neonatal anomaly categories*					
				1	2	3	4	5	6
Birmingham East & North	31,780	78	2.48	13	5	10	17	5	28
Coventry	20,338	31	1.53	3	4	3	10	1	10
Dudley	17,648	18	1.03	2	1	0	8	0	7
Heart of Birmingham	27,584	99	3.62	16	8	5	19	10	41
Herefordshire	8,579	5	0.59	0	0	0	2	0	3
North Staffordshire	10,152	12	1.19	2	0	0	6	1	3
Sandwell	20,935	38	1.83	9	2	0	10	4	13
Shropshire	14,057	11	0.79	5	1	0	3	0	2
Solihull	10,375	19	1.84	1	0	2	8	2	6
South Birmingham	21,445	33	1.55	9	1	4	7	4	8
South Staffordshire	32,682	44	1.35	9	3	4	14	0	14
Stoke on Trent	16,827	32	1.91	4	2	3	15	3	5
Telford & Wrekin	10,499	17	1.63	4	1	0	6	1	5
Walsall Teaching	17,404	36	2.08	6	3	2	14	2	9
Warwickshire	28,872	31	1.08	8	0	3	10	1	9
Wolverhampton	15,883	26	1.65	8	1	3	5	2	7
Worcestershire	30,193	40	1.33	9	0	1	16	1	13
WEST MIDLANDS	335,253	570	1.71	108	32	40	170	37	183

* Categories as listed in Table 14.1

Chromosomal abnormalities are the single largest category of congenital anomalies, and the largest proportion of these is trisomies, which include mostly Down's syndrome (trisomy 21), as well Edwards (18) and Patau (13) syndromes.

14.3 Down's Syndrome (trisomy 21)

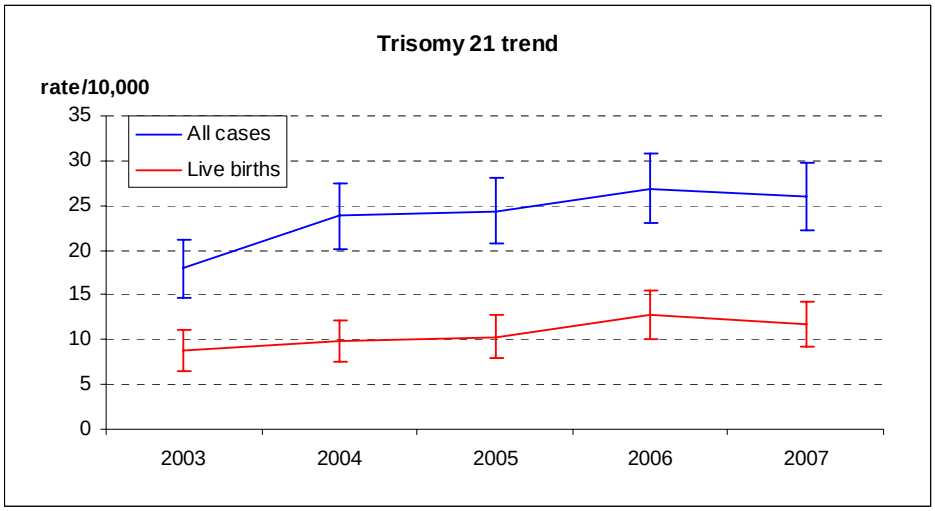
Down's syndrome is a chromosomal anomaly caused by an extra chromosome 21. It is the most common condition associated with autosomal aneuploidy at birth and a significant cause of learning difficulties. The prevalence of trisomy 21 is known to be associated with maternal age.

During the period reported here, the West Midlands had a second trimester serum screening strategy offered routinely to all women, with an uptake of approximately 60-70%. The antenatal detection rate for Down's syndrome has changed little in recent years and is approximately 55%.

Children with Down's syndrome have moderate to severe learning difficulties and other structural malformations are common, particularly congenital heart defects and duodenal atresia. Outcomes of pregnancy can be altered by termination following detection. Mortality in continuing pregnancies will be determined by the presence of additional structural malformations.

We report the incidence as 1. all cases (regardless of outcome, including terminations), and 2. live births only.

Figure 14.4: Trisomy 21 cases (all outcomes) West Midlands 2003-2007



The average incidence of Down's syndrome in the West Midlands between 2003 and 2007 was 23.9/10,000 births (1 in 419 births) (all outcomes), and 10.4/10,000 live births (1:958).

The incidence of Down's syndrome is increasing mainly because of an increasing age of the maternal population.

Figure 14.5: Trisomy 21 cases (all outcomes) West Midlands 2003-2007: incidence by maternal age

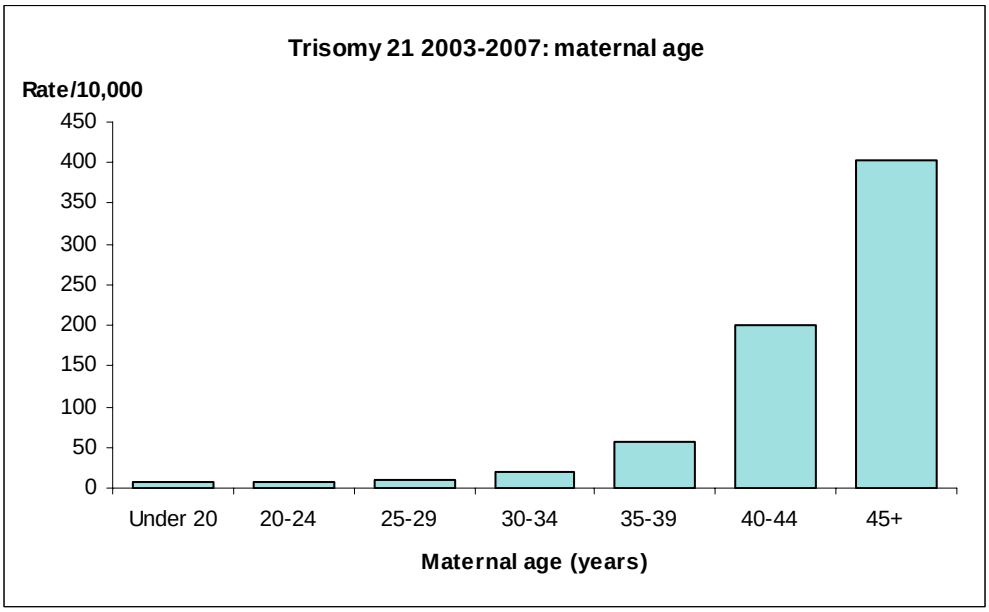
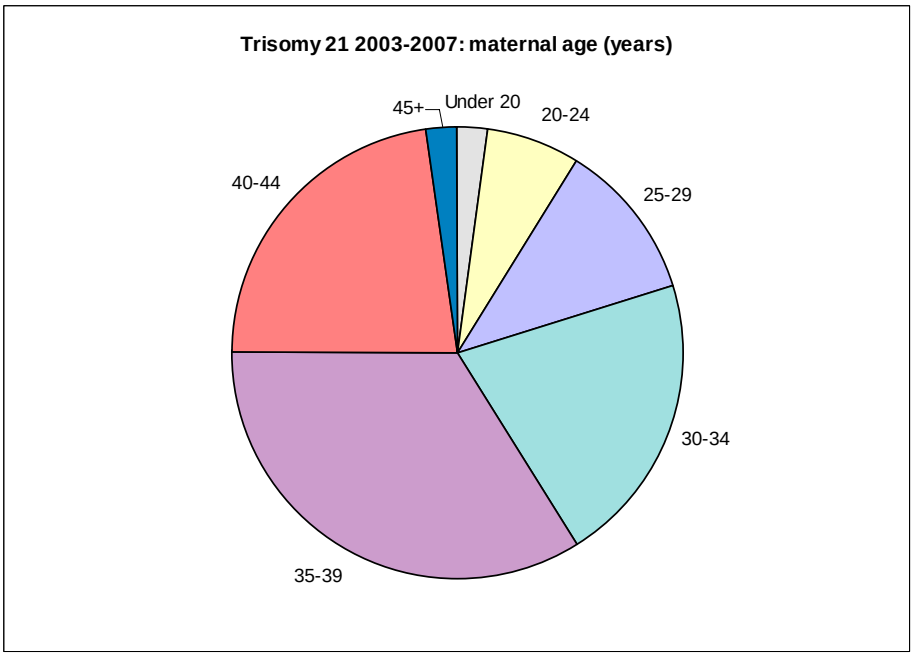
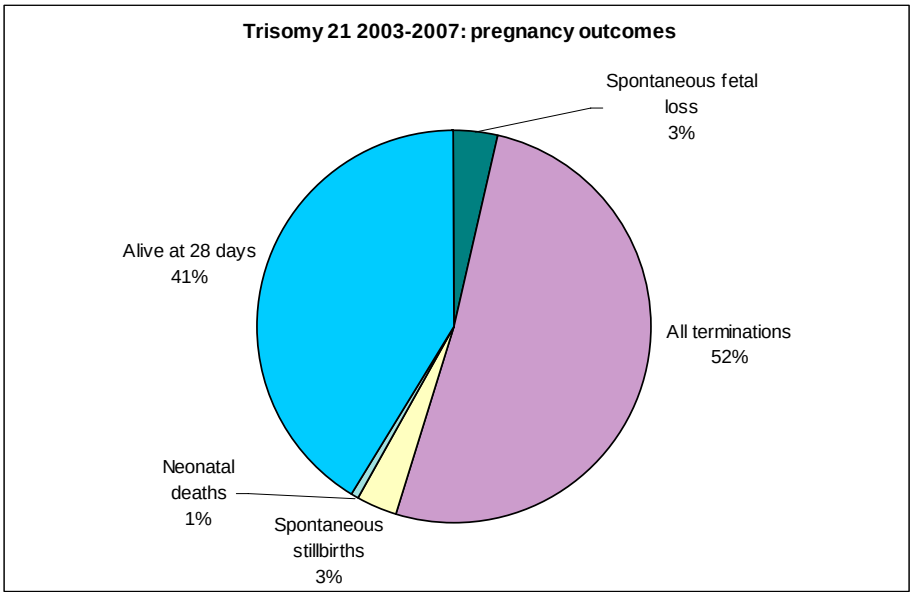


Figure 14.6: Trisomy 21 (all outcomes), West Midlands 2003-2007: proportions within maternal categories



Although most (53%) of births occur in mothers aged 25-35 years, the majority (57%) of trisomy 21 births occur in mothers aged 35-45. Maternal age is an important parameter in the calculation of risk for mothers choosing antenatal screening for Down's syndrome screening.

Figure 14.7: Trisomy 21 West Midlands 2003-2007: outcomes



Note: The category "all terminations' includes mostly terminations before 24 weeks gestation, but also terminations counted as stillbirths or neonatal deaths, if born alive.

The outcome of affected pregnancies is dependent on prenatal diagnosis, parental decisions about termination, and the presence of additional major structural anomalies. Of affected pregnancies, 43% result in live births.

Table 14.4: Trisomy 21 cases (all outcomes), West Midlands PCTs 2003-2007*

PCT	Total births	Down's cases	Rate /10,000	95%CI
Birmingham East & North	31,780	75	23.6	18.3-28.9
Coventry	20,338	46	22.6	16.1-29.1
Dudley	17,648	26	14.7	9.1-20.4
Heart of Birmingham	27,584	51	18.5	13.4-23.6
Herefordshire	8,579	21	24.5	14.0-34.9
North Staffordshire	10,152	25	24.6	15.0-34.3
Sandwell	20,935	40	19.1	13.2-25.0
Shropshire County	14,057	37	26.3	17.9-34.8
Solihull	10,375	31	29.9	19.4-40.4
South Birmingham	21,445	50	23.3	16.9-29.8
South Staffordshire	32,682	103	31.5	25.4-37.6
Stoke-on-Trent	16,827	26	15.5	9.5-21.4
Telford & Wrekin	10,499	25	23.8	14.5-33.1
Walsall	17,404	37	21.3	14.4-28.1
Warwickshire	28,872	85	29.4	23.2-35.7
Wolverhampton City	15,883	31	19.5	12.7-26.4
Worcestershire	30,193	92	30.5	24.3-36.7
WEST MIDLANDS	335,253	801	23.9	22.2-25.5

Table 14.5: Trisomy 21 cases (live births only) West Midlands PCTs 2003-2007*

PCT	Live births	Down's cases	% Live born	Rate /10,000	95%CI
Birmingham East & North	31,524	39	52%	12.4	18.4-29.2
Coventry	20,248	20	43%	9.9	16.2-29.3
Dudley	17,544	10	38%	5.7	9.1-20.5
Heart of Birmingham	27,357	37	73%	13.5	13.5-23.8
Herefordshire	8,541	11	52%	12.9	14.1-35.1
North Staffordshire	10,105	11	44%	10.9	15.1-34.4
Sandwell	20,810	25	63%	12.0	13.3-25.2
Shropshire County	13,997	15	41%	10.7	17.9-34.9
Solihull	10,327	13	42%	12.6	19.5-40.6
South Birmingham	21,318	22	44%	10.3	17.0-29.9
South Staffordshire	32,526	40	39%	12.3	25.6-37.8
Stoke on Trent	16,724	16	62%	9.6	9.6-21.5
Telford & Wrekin	10,432	12	48%	11.5	14.6-33.3
Walsall	17,317	15	41%	8.7	14.5-28.2
Warwickshire	28,751	21	25%	7.3	23.3-35.8
Wolverhampton City	15,789	12	39%	7.6	12.7-26.5
Worcestershire	30,037	29	32%	9.7	24.4-36.9
WEST MIDLANDS	333,347	348	43%	10.4	22.4-25.7

* Cases are listed by place of residence at delivery

14.4 Edwards' Syndrome (trisomy 18) and Patau's Syndrome (trisomy 13)

Edwards' syndrome is caused by the presence of an extra 18th chromosome (trisomy 18). It shares the same aetiology as Down's syndrome, but occurs less frequently, and is also associated with maternal age.

Patau syndrome is caused by the presence of an extra 13th chromosome (trisomy 13). It shares many of the same features as trisomy 18 in that the mortality rate is almost 100% and is associated with structural anomalies. However, its incidence is much lower than trisomy 18.

There is no national or regional screening programme for trisomies 18 and 13, but cases may be identified coincidently by serum screening undertaken for Down's syndrome. Despite the lack of a formal screening programme, the antenatal detection rate for trisomies 18 and 13 is much higher than for Down's syndrome. This is due to the high proportion of cases with additional structural malformations such as exomphalos, facial clefts, and limb abnormalities that are amenable to detection by ultrasound.

Trisomies 18 and 13 are considered to be two of the few universally lethal congenital anomalies. Some cases do survive past the neonatal period, but these are likely to have mosaic karyotypes.

The incidence of Edward's syndrome in the West Midlands (2003-2007) was

- 6.9/10,000 births (1:1,458) for all outcomes, and
- 0.9/10,000 live births (1:11,112).

The incidence of Patau syndrome in the West Midlands (2003-2007) was

- 2.4/10,000 births (1:4,244) for all outcomes, and
- 0.4/10,000 live births (1:23,811).

Figure 14.8: Trisomy 18 and 13 cases (all outcomes) West Midlands 2003-2007

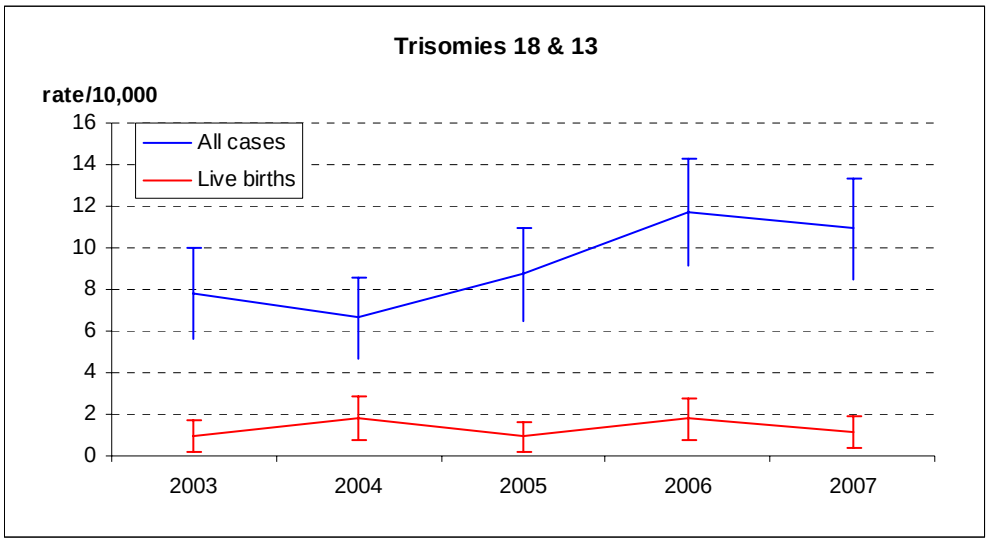


Figure 14.9: Trisomy 18 cases (all outcomes) by maternal age (years)

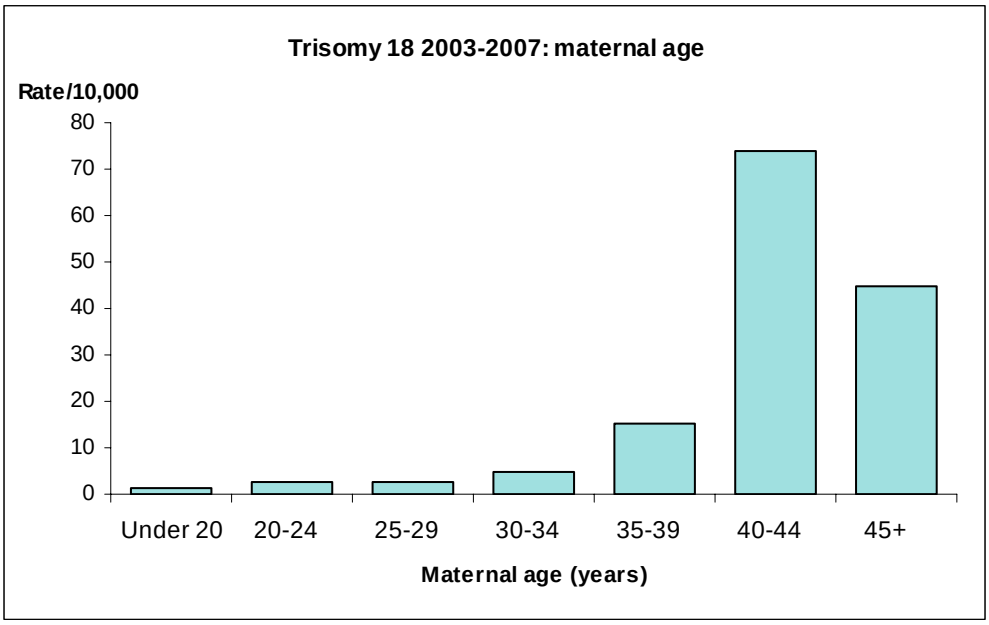
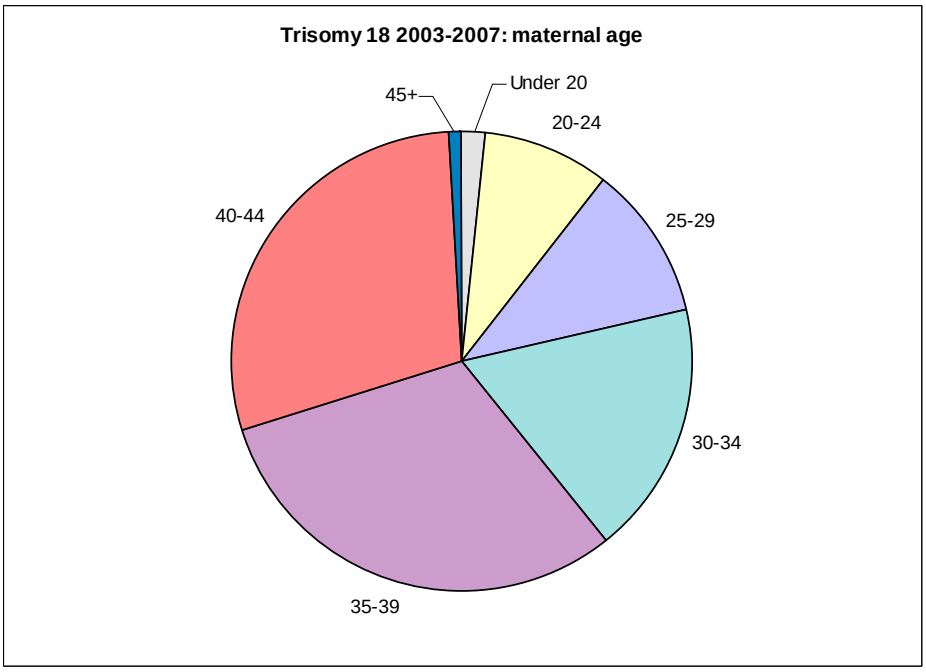
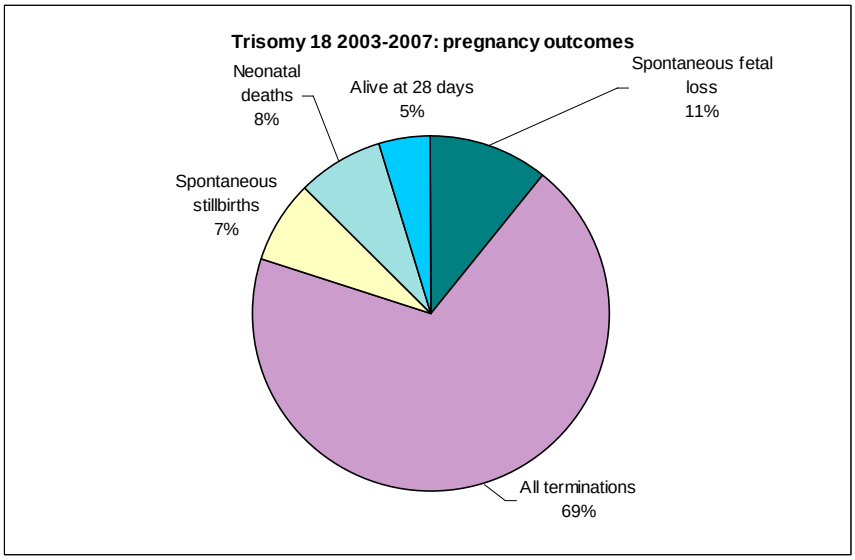


Figure 14.10: Trisomy 18 cases (all outcomes) within maternal age categories



The prevalence of trisomy 18 increases with maternal age. 61% of affected pregnancies occur in mothers aged 35 years or older

Figure 14.11: Trisomy 18 cases 2003-2007: outcomes



Note: The category "all terminations' includes mostly terminations before 24 weeks gestation, but also includes terminations counted as stillbirths or neonatal deaths, if born alive.

Unlike trisomy 21, trisomy 18 has a mortality rate approaching 100%. Cases of trisomy 18 that survive past the neonatal period are likely to be cases with mosaic karyotypes. The termination rate is 69%, higher than for trisomy 21 (52%) despite the absence of a formal screening programme for this anomaly.

Figure 14.12: Trisomy 13 cases 2003-2007: outcomes

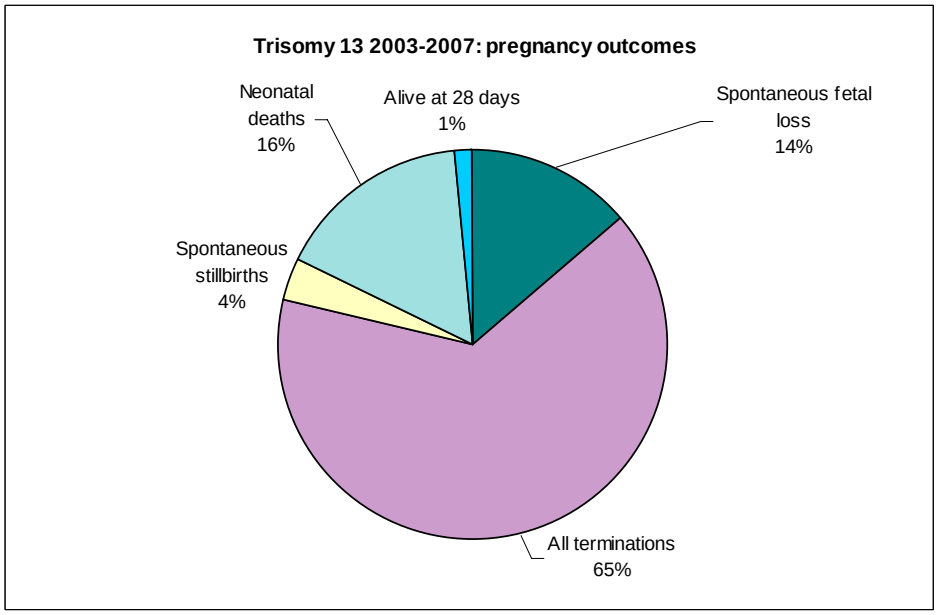


Table 14.6: Trisomies 18 & 13 (all outcomes), West Midlands 2003-2007

PCT	Total births	Cases	Rate /10,000	95%CI
Birmingham East & North	29	9.1	5.8-12.4	31,780
Coventry	12	5.9	2.6-9.2	20,338
Dudley	15	8.5	4.2-12.8	17,648
Heart of Birmingham	23	8.3	4.9-11.7	27,584
Herefordshire	3	3.5	0.0-7.5	8,579
North Staffordshire	10	9.9	3.7-16.0	10,152
Sandwell	13	6.2	2.8-9.6	20,935
Shropshire County	16	11.4	5.8-17.0	14,057
Solihull	13	12.5	5.7-19.3	10,375
South Birmingham	26	12.1	7.5-16.8	21,445
South Staffordshire	37	11.3	7.7-15.0	32,682
Stoke on Trent	15	8.9	4.4-13.4	16,827
Telford & Wrekin	12	11.4	5.0-17.9	10,499
Walsall	11	6.3	2.6-10.1	17,404
Warwickshire	27	9.4	5.8-12.9	28,872
Wolverhampton City	13	8.2	3.7-12.6	15,883
Worcestershire	34	11.3	7.5-15.0	30,193
WEST MIDLANDS	309	9.2	8.2-10.2	335,253

Data Sources

- West Midlands Congenital Anomaly Register
- WM Perinatal Death Notification
- ADBE data (ONS)