

# Childbirth in Victoria

Trends in operative delivery (caesarean section, vacuum extraction and forceps delivery) for women having their first birth at term

September 2004

**The Consultative Council on Obstetric  
and Paediatric Mortality and Morbidity**

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# 1. Introduction

The Consultative Council on Obstetric and Paediatric Mortality and Morbidity (CCOPMM) routinely collects information on maternal and perinatal mortality and morbidity and has published Annual Reports since 1962. Funding from the Programs Branch, Metropolitan Health and Aged Care Services Division, Department of Human Services (DHS), has enabled the employment of a Research Officer for 12 months to investigate and report on some of the major causes of maternal morbidity in Victoria.

Previous reports prepared by the CCOPMM as a result of this project are *Obstetric Haemorrhage and Associated Hysterectomy*, and *Episiotomy and Perineal Lacerations*. These reports are available at <http://www.health.vic.gov.au/perinatal/pubs.htm>.

The subject of this report is operative delivery (caesarean section, vacuum extraction and forceps delivery) in Victorian women having their first birth at term. It was prepared in response to concerns expressed about increasing rates of operative delivery in Victoria. While it is recognised that operative delivery does not of itself constitute maternal morbidity, it is a risk factor for some morbidities and an item of major community interest, and therefore requires close monitoring. The aim of this report is to describe trends and factors that may be associated with operative delivery, including induction, in a population of relatively low-risk women having their first birth.

Reports resulting from this project are distributed to DHS and maternity service providers. It is anticipated that the information will assist DHS and other relevant agencies to develop appropriate policy interventions and service improvements.

## 2. Methodology

### 2.1 Project team

The CCOPMM project team comprised Kerry Haynes, Research Officer; Christine Stone, Consultant Epidemiologist and James King, Chair, CCOPMM.

The project was supported by the Programs Branch, Metropolitan Health and Aged Care Services Division, DHS.

### 2.2 Clinical reference group

A clinical reference group was established to advise and guide the project. The group is a sub-committee of the Maternity Services Advisory Committee and includes representation from consumers, midwives and obstetricians, as follows:

- Pauline Ahearne, Maternity Coalition
- Mary-Anne Biro, Victoria University of Technology
- Julie Collette, Mercy Hospital for Women
- Euan Wallace, Monash University.

### 2.3 Data source

The data used for this report were extracted from the Victorian Perinatal Data Collection Unit (VPDCU) databases, DHS. This is a mandatory reporting system of all births in Victoria at or beyond 20 weeks gestation.

VPDCU data from the four years 1999 to 2002 was the main data source for this report. This time period was selected because data related to operative delivery was considered to be more consistent over these years (see Section 2.5 below). However, earlier VPDCU data from 1992 to 1998 was used in the analysis of trends.

#### 2.3.1 Validity of VPDCU data

The validity of certain VPDCU database variables has been studied (VPDCU, unpublished data). The data items used in compiling this report were examined in the 1999 validation study (see Appendix). The results showed that hospital medical records and VPDCU forms were in agreement more than 90% of the time for most of the variables investigated in this study. However reporting of certain maternal medical conditions and complications of labour, birth or the postnatal period (used in excluding cases from the study population) was less reliable.

### 2.4 Study population

The study population was women giving birth in Victoria. In most cases the sample population used for analysis was first births that were singleton, vertex and at term (37 completed weeks gestation and greater) in women who did not have any obstetric complications or pre-existing hypertension, diabetes, cardiac disease or mental illness. Women who were having a second birth following a previous vaginal delivery (with the same exclusions as those having first births) were examined in some analyses.

## 2.5 Definitions

Definitions of relevant VPDCU variables are explained below. Some of these variables have changed over time, which could affect the results of this study.

**Elective caesarean:** Prior to 1999 elective caesarean was defined as an operation performed before the onset of labour. From 1999 onwards a distinction was made between elective caesarean with and without labour. During this time, 0.3% of first births and 0.1% of second births resulted in an elective caesarean after the commencement of labour.

**Emergency caesarean:** Prior to 1999 emergency caesarean was defined as an operation performed after the onset of labour. From 1999 onwards a distinction was made between emergency caesarean with and without labour. During this time, 0.9% of first births and 0.2% of second births resulted in an emergency caesarean section performed before the commencement of labour.

**Maternal medical conditions,** used in the selection of cases in the population to be studied: From 1999 to 2002 pre-existing hypertension, diabetes, cardiac disease and mental illness were 'tick box' items used to identify maternal medical conditions on the VPDCU data collection form. Prior to 1999 only the first three conditions were 'tick box' items and mental illness was identified using free text.

**Second birth:** Type of delivery for the previous birth was not collected prior to 1998, so women who were having second births following a previous vaginal birth could not be identified during that time. Consequently trend data for second births (following a previous vaginal birth) are only provided for the years 1998 to 2002.

**Epidural analgesia** refers to epidural analgesia during labour that was epidural/spinal/caudal with or without intramuscular narcotics.

## 2.6 Data analysis

Data were analysed using SPSS (version 10). The total population used in the calculations appears in each table. There were missing values in some variables, therefore totals may not be the same for each variable.

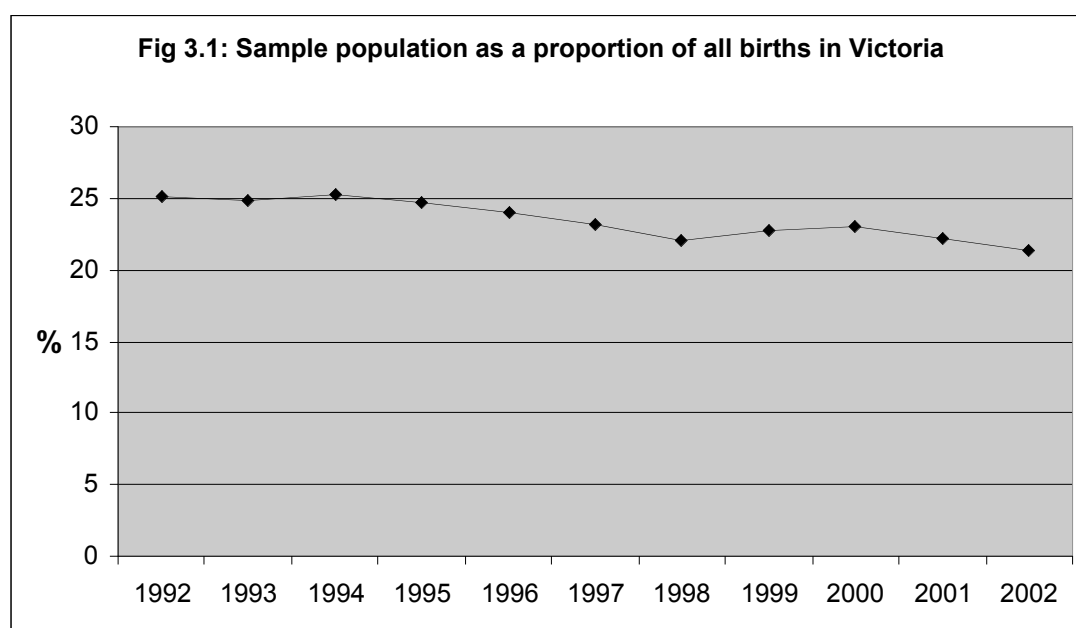
### 3. Trends in operative delivery and induction rates in first births

#### 3.1 First births

Women who have singleton, vertex, term deliveries and do not have any obstetric complications or pre-existing hypertension, diabetes, cardiac disease or mental illness could be considered to be at relatively low risk of having complications of labour or delivery. First births in this group of women were selected as the sample population for analysis in this study, as this group is of particular clinical interest because they are at high risk of operative delivery. When considered as a proportion of all births in Victoria, the sample comprised 23.5% overall and declined slightly from 25.1% in 1992 to 21.3% in 2002 (see Table 3.1 and Figure 3.1).

**Table 3.1: Proportion of the sample population (first births that were singleton, vertex, term deliveries in women without major medical conditions or obstetric complications) as a proportion of all births in Victoria 1992-2002**

Year	Births in Victoria	Sample population	
	n	n	%
1992	65404	16416	25.1
1993	63795	15820	24.8
1994	63983	16123	25.2
1995	62734	15519	24.7
1996	62028	14915	24.0
1997	61312	14150	23.1
1998	61071	13469	22.1
1999	61588	13977	22.7
2000	61571	14141	23.0
2001	61106	13563	22.2
2002	61959	13167	21.3



## 3.2 Operative delivery

This section of the report provides trend data on operative delivery in this sub-population of first births. As shown in Table 3.2 and Figure 3.2, combined operative delivery rates increased from 38.9% in 1992 to 47.3% in 2002. While forceps delivery rates decreased (24.9% to 13.7%), there was a corresponding increase in vacuum extraction delivery rates (1.9% to 12.7%). Consequently instrumental vaginal delivery rates remained constant (mean 26.6%). Rates of both elective and emergency caesarean deliveries increased from 1992 to 2002 (elective caesarean from 1.6% to 3.7% and emergency caesarean from 10.5% to 17.2%) (see Figure 3.3).

**Table 3.2: Trends in operative delivery (first births)**

Year	Total	SVD <sup>1</sup>	Forceps	Vacuum	Elective cs	Emerg cs	Instrumental vag delivery <sup>2</sup>	Operative delivery <sup>3</sup>
	n	%	%	%	%	%	%	%
1992	16,416	61.1	24.9	1.9	1.6	10.5	26.9	38.9
1993	15,820	61.0	25.3	1.9	1.7	10.1	27.2	39.0
1994	16,123	60.4	24.4	2.6	1.9	10.7	27.0	39.6
1995	15,519	61.8	22.7	2.9	2.0	10.8	25.5	38.2
1996	14,915	61.1	21.8	4.1	2.0	11.0	25.8	38.9
1997	14,150	59.6	20.9	5.6	2.2	11.7	26.5	40.4
1998	13,469	58.4	19.1	7.6	2.5	12.4	26.7	41.6
1999	13,977	57.0	17.0	9.6	2.5	13.9	26.6	43.0
2000	14,141	56.0	14.7	11.9	2.6	14.8	26.6	44.0
2001	13,563	53.7	14.6	12.3	3.3	16.1	26.9	46.3
2002	13,167	52.7	13.7	12.7	3.7	17.2	26.4	47.3

<sup>1</sup>Spontaneous vaginal delivery <sup>2</sup>Forceps and vacuum extraction deliveries combined

<sup>3</sup>Forceps, vacuum extraction, elective caesarean and emergency caesarean deliveries combined

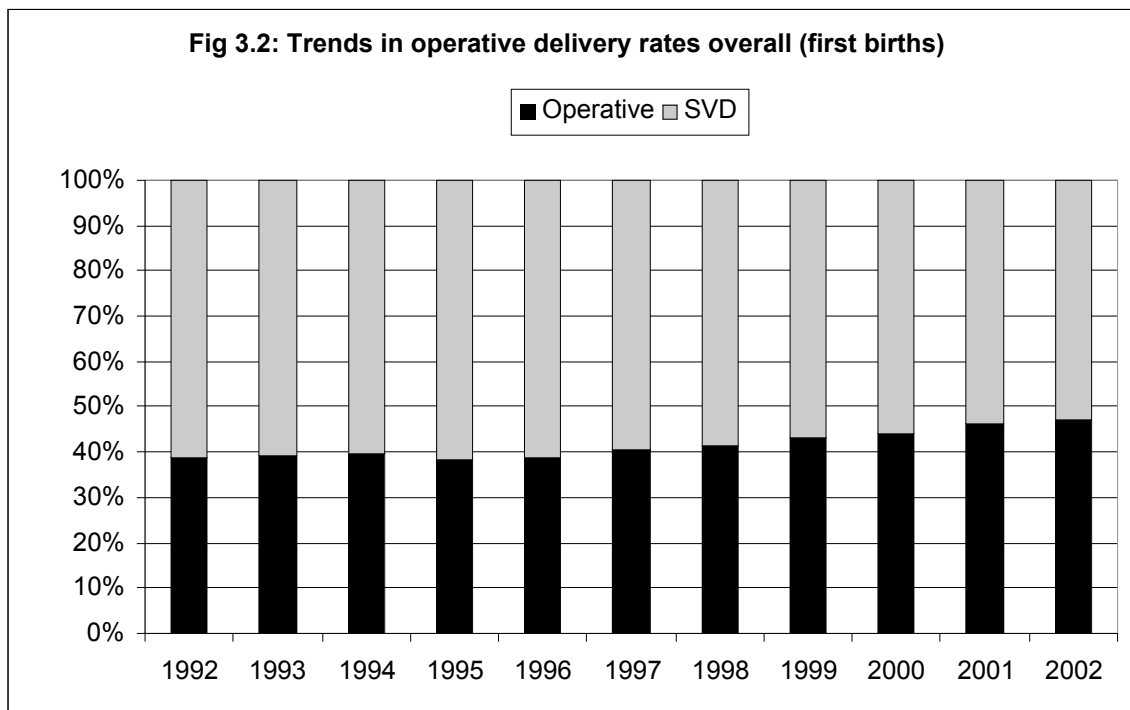


Table 3.3 and Figure 3.4 show operative delivery rates in first births from 1998 to 2002 according to maternal accommodation status. This time period was selected as data on accommodation status was only available from 1998 onwards.

Forceps delivery rates were lower in public patients than private patients, and rates declined in both sectors (public: 15.0% to 9.4%, private: 26.5% to 19.1%). Vacuum extraction delivery rates were slightly higher in private patients than in public patients for all years, and appeared to increase in both (public: 7.2% to 12.4%, private: 8.3% to 13.0%). Elective caesarean rates were higher in private patients than public patients, and only appeared to increase in the private sector (3.7% to 6.1%). Emergency caesarean rates were higher amongst private patients, and rates for both public and private patients increased during this period (public: 10.4% to 15.0%, private: 16.1% to 20.0%).

Of note, is the proportion of first births in 2002 achieving spontaneous vaginal delivery (SVD): 61.4% of public patients and 41.8% of private patients.

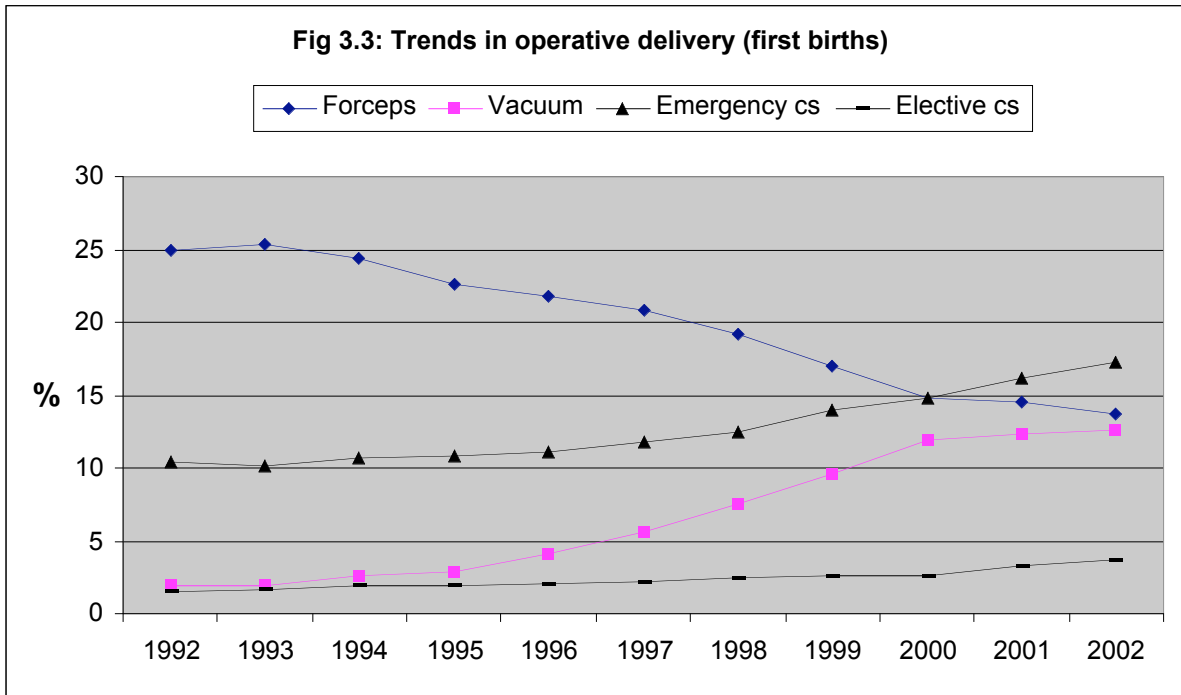
**Table 3.3: Trends in operative delivery according to accommodation status (first births)**

Year	Total n	Accom status	SVD <sup>1</sup> %	Forceps %	Vacuum %	Elective cs %	Emerg cs %	Instrumental vag delivery <sup>2</sup> %	Operative delivery <sup>3</sup> %
1998	8,654	Public	65.6	15.0	7.2	1.8	10.4	22.2	34.4
1999	9,403	Public	63.2	13.9	9.1	1.7	12.1	23.0	36.8
2000	9,250	Public	63.0	11.8	11.2	1.4	12.6	23.0	37.0
2001	7,889	Public	61.5	10.7	11.5	1.7	14.5	23.2	38.4
2002	7,303	Public	61.4	9.4	12.4	1.8	15.0	21.8	38.6
1998	4,815	Private	45.4	26.5	8.3	3.7	16.1	34.8	54.6
1999	4,574	Private	44.2	23.2	10.7	4.2	17.6	33.9	55.7
2000	5,674	Private	42.7	19.9	13.5	5.6	18.4	33.4	57.4
2001	5,674	Private	42.7	19.9	13.5	5.6	18.4	33.4	57.4
2002	5,864	Private	41.8	19.1	13.0	6.1	20.0	32.1	58.2

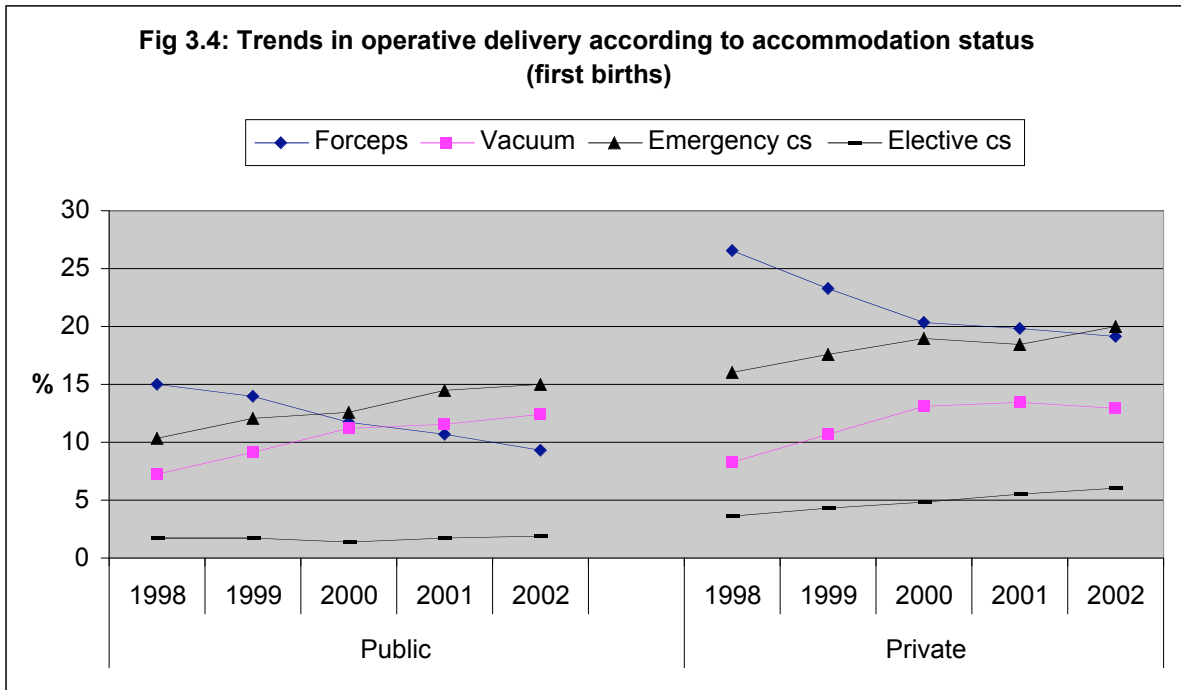
<sup>1</sup>Spontaneous vaginal delivery <sup>2</sup>Forceps and vacuum extraction deliveries combined

<sup>3</sup>Forceps, vacuum extraction, elective caesarean and emergency caesarean deliveries combined

**Fig 3.3: Trends in operative delivery (first births)**



**Fig 3.4: Trends in operative delivery according to accommodation status (first births)**



### 3.3 Induction

This section of the report provides trend data on induction of labour in first births from 1992 to 2002. Data on the indications for induction of labour are not included. As can be seen in Table 3.4 and Figure 3.5 induction rates increased during this period from 16.1% to 25.9%.

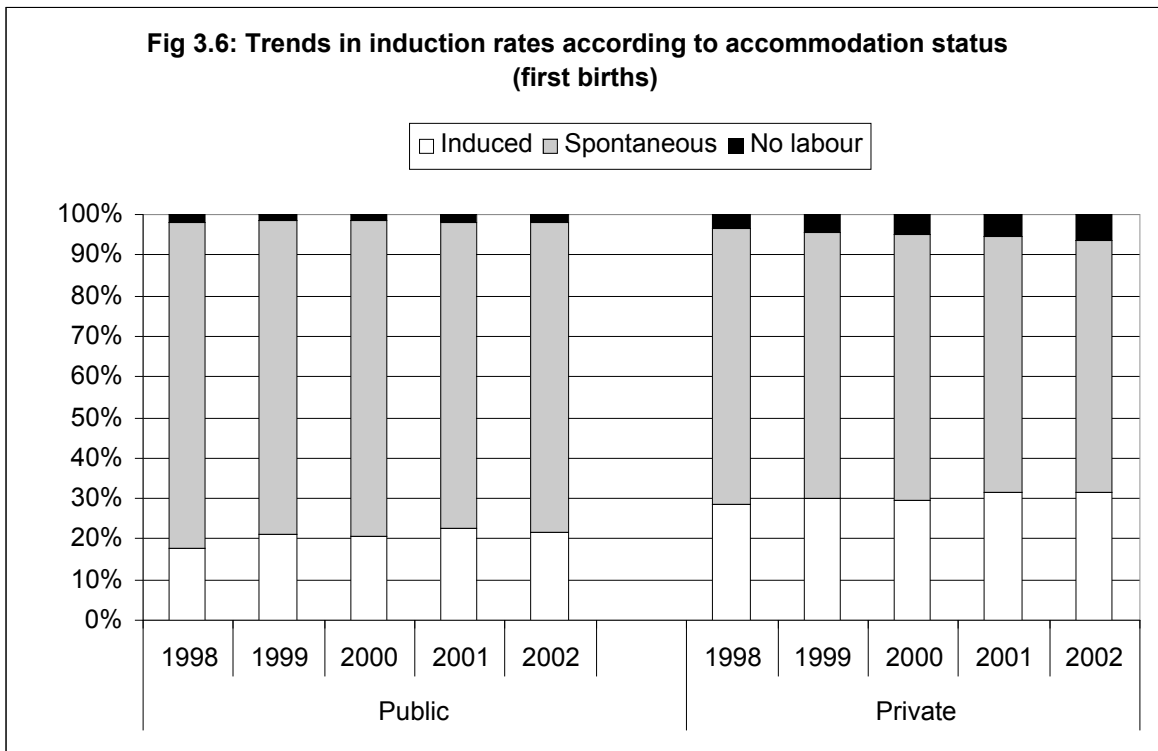
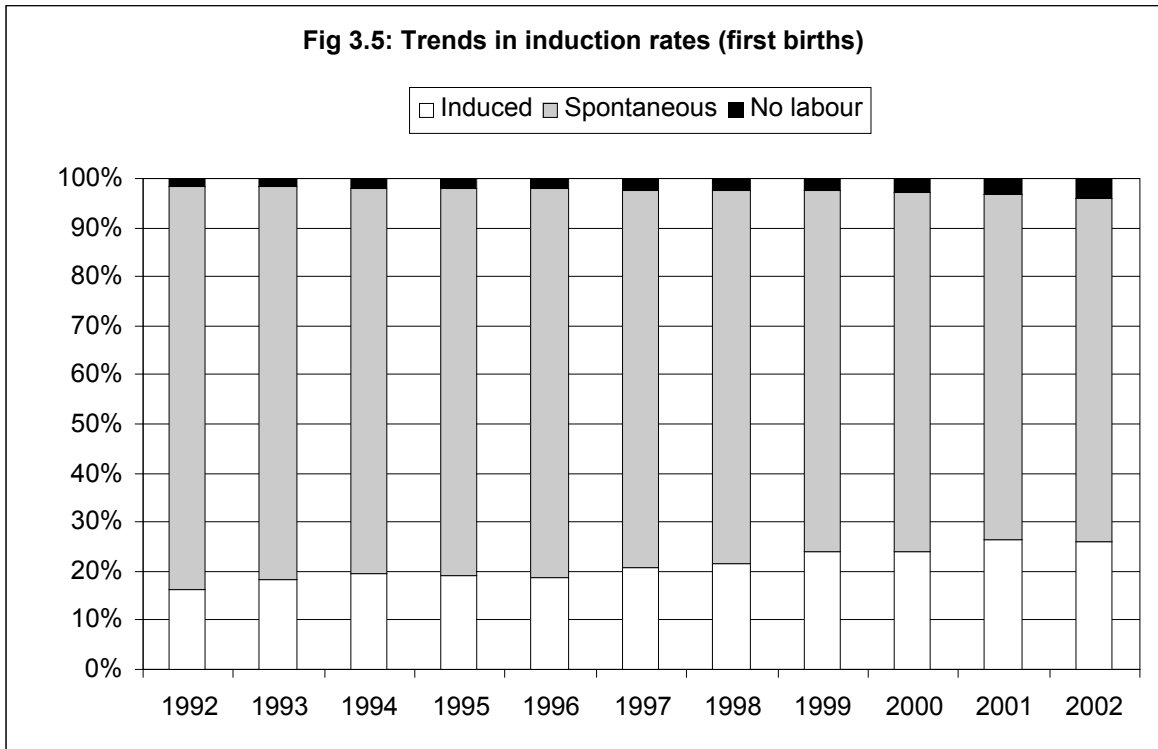
**Table 3.4: Trends in induction rates in first births**

Year	Total (n)	Induced (%)	Spont labour (%)	No labour (%)
1992	16,416	16.1	82.4	1.6
1993	15,820	18.3	80.0	1.7
1994	16,123	19.4	78.7	1.9
1995	15,519	19.2	78.8	2.0
1996	14,915	18.6	79.4	2.0
1997	14,150	20.8	77.0	2.2
1998	13,469	21.5	76.0	2.5
1999	13,977	23.9	73.5	2.6
2000	14,141	23.8	73.5	2.8
2001	13,563	26.5	70.1	3.4
2002	13,167	25.9	70.1	3.9

Induction of labour according to maternal accommodation status is shown in Table 3.5 and Figure 3.6. Induction rates were higher in private patients than public patients, and appeared to increase slightly in both sectors from 1998 to 2002 (public: 17.7% to 21.6%, private: 28.5% to 31.4%).

**Table 3.5: Trends in induction rates according to accommodation status (first births)**

Year	Total (n)	Accom status	Induced (%)	Spont labour (%)	No labour (%)
1998	8,654	Public	17.7	80.5	1.8
1999	9,403	Public	20.9	77.4	1.7
2000	9,250	Public	20.6	77.9	1.5
2001	7,889	Public	22.9	75.3	1.8
2002	7,303	Public	21.6	76.4	2.1
1998	4,815	Private	28.5	67.9	3.7
1999	4,574	Private	30.1	65.5	4.4
2000	4,891	Private	29.7	65.2	5.1
2001	5,674	Private	31.5	62.9	5.6
2002	5,864	Private	31.4	62.3	6.3



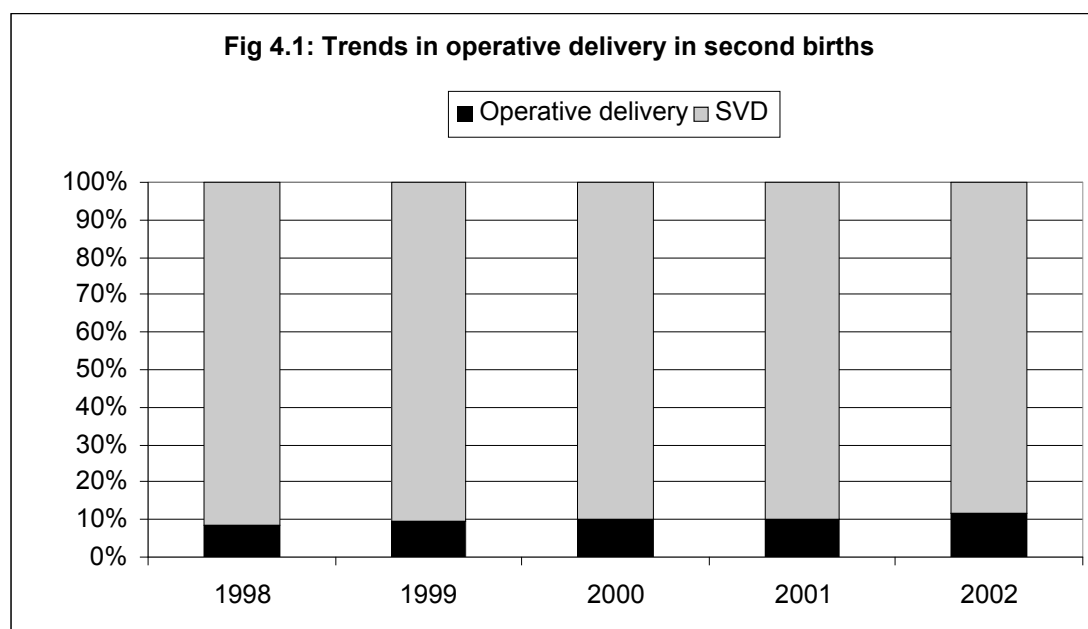
## 4. Trends in operative delivery and induction rates in second births

### 4.1 Operative delivery

This section of the report provides selected trend data on operative delivery in second births (following a previous vaginal delivery) that were singleton, vertex and at term in women without obstetric complications or pre-existing hypertension, diabetes, cardiac disease or mental illness. Analyses were conducted using this sub-population to contrast with the relatively greater rates of operative delivery rates in first births. From 1998 to 2002 operative delivery rates in second births increased from 8.4% to 11.5%, whereas rates in first births for the same period were 41.6% to 47.3% (see Table 4.1 and Figure 4.1).

**Table 4.1: Trends in operative delivery in first births and second births**

Year	First births		Second births	
	Total n	Operative delivery %	Total n	Operative delivery %
1998	13,469	41.6	11618	8.4
1999	13,977	43.0	11320	9.3
2000	14,141	44.0	11267	9.9
2001	13,563	46.3	10852	10.2
2002	13,167	47.3	10576	11.5



Combined instrumental vaginal delivery rates in second births, while much less than in first births, appeared to increase steadily from 5.1% in 1998 to 6.3% in 2002. When examined separately, forceps delivery rates in second births decreased slightly from 3.0% to 2.8%, and vacuum extraction delivery rates increased from 2.1% to 3.5%. Rates of emergency and elective caesarean both increased slightly (1.7% to 2.4% for emergency caesarean and 1.6% to 2.8% for elective caesarean) (see Table 4.2).

**Table 4.2: Trends in operative delivery in second births**

Year	Total	SVD <sup>1</sup>	Forceps	Vacuum	Emerg cs	Elective cs	Instrumental vag delivery <sup>2</sup>	Operative delivery <sup>3</sup>
	n	%	%	%	%	%	%	%
1998	11,618	91.6	3.0	2.1	1.7	1.6	5.1	8.4
1999	11,320	90.7	3.0	2.3	2.1	1.8	5.3	9.2
2000	11,267	90.1	2.5	3.3	2.0	2.0	5.8	9.8
2001	10,852	89.8	2.6	3.3	2.3	2.1	5.9	10.3
2002	10,576	88.5	2.8	3.5	2.4	2.8	6.3	11.5

<sup>1</sup>Spontaneous vaginal delivery <sup>2</sup>Forceps and vacuum extraction deliveries combined

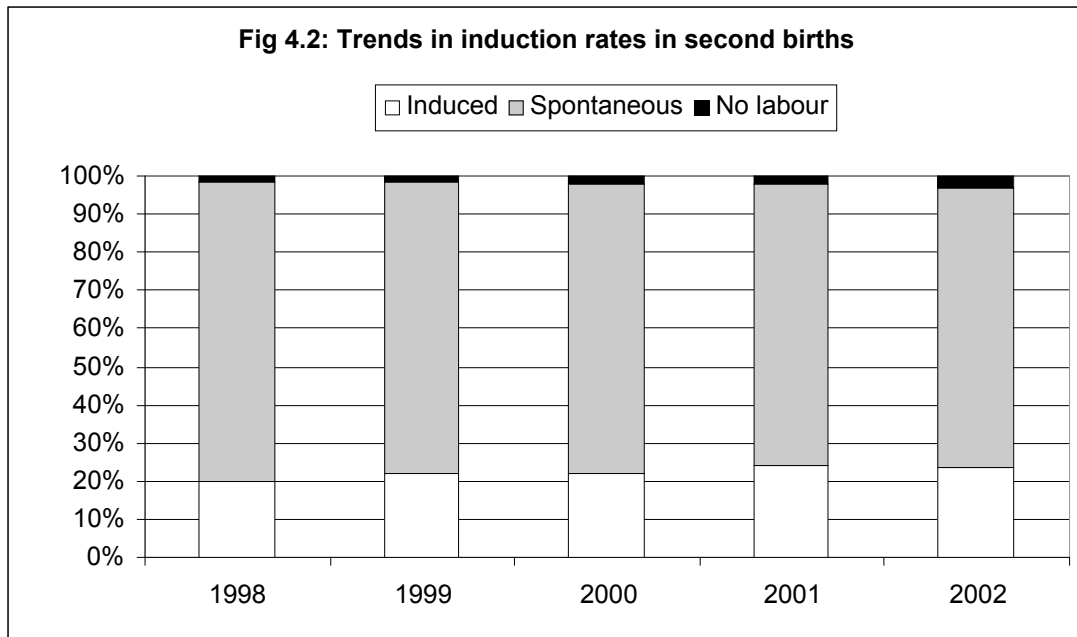
<sup>3</sup>Forceps, vacuum extraction, elective caesarean and emergency caesarean deliveries combined

## 4.2 Induction

Labour induction rates in second births increased from 19.9% in 1998 to 23.4% in 2002 (see Table 4.2 and Fig 4.2).

**Table 4.2: Trends in induction rates in second births**

Year	Total (n)	Induced (%)	Spont labour (%)	No labour (%)
1998	11,618	19.9	78.5	1.6
1999	11,320	22.1	76.1	1.8
2000	11,267	22.2	75.9	2.0
2001	10,852	23.9	73.9	2.2
2002	10,576	23.4	73.7	2.9



Induction rates in second births were similar to those in first births, and both increased slightly from 1998 to 2002 (first births: 21.5% to 25.9%, second births: 19.9% to 23.4%) (see Table 4.3).

**Table 4.3: Comparison of induction rates in first births and second births**

Year	First births		Second births	
	Total (n)	Induced (%)	Total (n)	Induced (%)
1998	13,469	21.5	11,618	19.9
1999	13,977	23.9	11,320	22.1
2000	14,141	23.8	11,267	22.2
2001	13,563	26.5	10,852	23.9
2002	13,167	25.9	10,576	23.4

## 5. Overall operative delivery rates 1999-2002

Rates of the different types of operative delivery in both first births and second births (that were singleton, vertex and at term in women without obstetric complications or pre-existing hypertension, diabetes, cardiac disease or mental illness) are provided in Table 5.1. Rates of forceps, vacuum extraction and emergency caesarean deliveries were much greater in first births, compared to second births, whereas rates of elective caesarean deliveries were only slightly higher.

It should be noted that in first births, forceps deliveries comprised 15.0%, and vacuum extraction deliveries comprised 11.6%, of all deliveries. If these delivery types are expressed as a proportion of vaginal deliveries, then forceps deliveries accounted for 18.4% and vacuum extraction 14.2%. In second births, forceps deliveries comprised 2.7% and vacuum extraction 3.1% of all births and 2.9% and 3.2% respectively of vaginal deliveries.

**Table 5.1: Frequency of different delivery types in first and second births**

Delivery type	First births		Second births	
	n	%	n	%
SVD	30,102	54.9	39,516	89.8
Forceps	8,232	15.0	1,202	2.7
Vacuum	6,362	11.6	1,364	3.1
Emergency caesarean	8,483	15.4	973	2.2
Elective caesarean	1,668	3.1	959	2.2
Total operative delivery	24,745	45.1	4,498	10.2
Total	54,848	100.0	44,015	100.0

## 6. Factors associated with operative delivery in first births

### 6.1 Introduction

This section of the report provides information on factors associated with operative delivery in first births (that were singleton, vertex and at term in women without obstetric complications or pre-existing hypertension, diabetes, cardiac disease or mental illness). Data from the period 1999 to 2002 were combined for analysis.

### 6.2 Maternal age and accommodation status

Younger women appeared to be more likely to have spontaneous deliveries (see Table 6.1). Higher proportions of women aged over 34 years had forceps and caesarean deliveries (particularly elective caesarean), compared to younger women. Rates of vacuum extraction delivery were similar in the 25-34 and over 34 age groups, and lower in the under 25 age group.

Higher proportions of private patients had forceps, vacuum extraction and caesarean deliveries (both emergency and elective), compared to public patients.

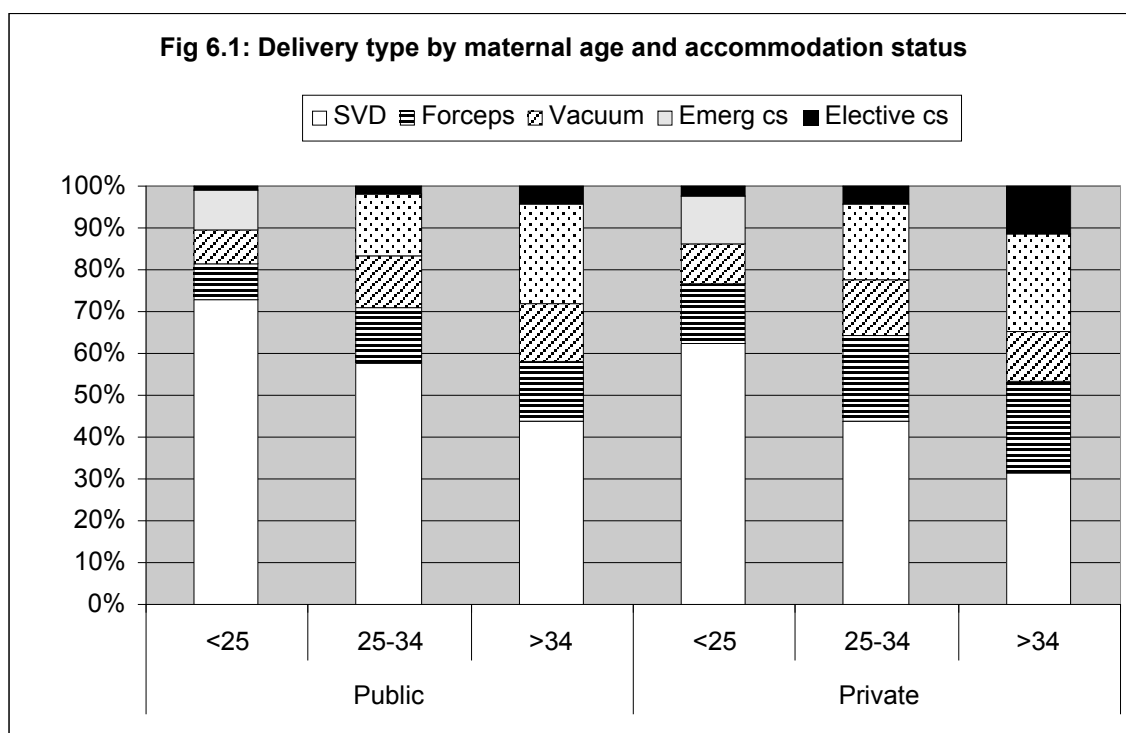
**Table 6.1: Type of delivery by maternal age and accommodation status**

	SVD	Forceps	Vacuum	Emerg cs	Elective cs	Total
Maternal age (yrs)	%	%	%	%	%	n
<25	71.8	9.0	8.4	9.6	1.3	13,601
25-34	51.4	16.7	12.7	16.5	2.8	35,611
>34	36.1	19.2	12.7	23.3	8.8	5,636
Accom status						
Public	62.4	11.6	10.9	13.4	1.7	33,845
Private	42.8	20.5	12.7	18.8	5.2	21,003

Women who were aged over 34 and were private patients had much higher rates of elective caesarean deliveries, compared to all other groups (see Table 6.2 and Figure 6.1). Rates of emergency caesarean and vacuum extraction delivery were similar for both public and private patients when examined for each age group. Forceps delivery rates were higher in private than public patients for all three age groups.

**Table 6.2: Type of delivery by maternal age and accommodation status**

		SVD	Forceps	Vacuum	Emerg cs	Elective cs	Total
Accom status (yrs)	Maternal age	%	%	%	%	%	n
Public	<25	72.8	8.4	8.2	9.4	1.1	12,357
	25-34	57.7	13.3	12.4	14.9	1.7	19,369
	>34	44.0	14.3	13.8	23.4	4.5	2,119
Private	<25	62.2	14.4	9.6	11.5	2.3	1,244
	25-34	43.8	20.6	13.0	18.4	4.1	16,242
	>34	31.4	22.1	12.0	23.2	11.4	3,517
<b>Total</b>							<b>54,848</b>



### 6.3 Induction of labour

Women who had induction of labour had approximately twice the rate of caesarean delivery, compared to those who had spontaneous labours. Rates of forceps and vacuum extraction delivery were also slightly higher amongst women who had inductions (see Table 6.3). It should be noted that the association between induction and caesarean delivery may be due to the same condition requiring both procedures, for example, in cases of fetal growth restriction, or fetal distress in association with prolonged pregnancy.

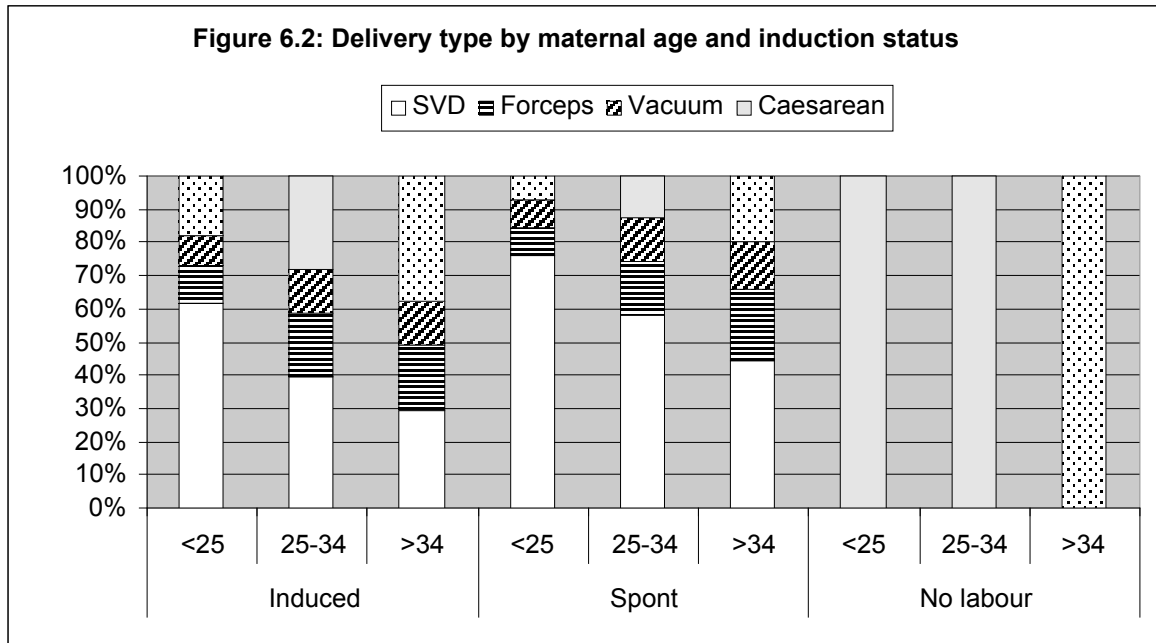
**Table 6.3: Type of delivery by induction status**

	SVD	Forceps	Vacuum	Caesarean	Total
Labour					
Induced	43.0	17.5	12.4	27.0	39,400
Spont	61.4	14.8	11.8	11.9	1,731
No labour	0.0	0.0	0.0	100.0	13,717

Rates of operative delivery according to whether the labour was induced or spontaneous, and then stratified by maternal age are shown in Table 6.4 and Figure 6.2. Women in all age groups had higher rates of caesarean deliveries (rather than other delivery types) when labour had been induced. The trend was more pronounced in women aged over 34 years.

**Table 6.4: Type of delivery by maternal age and induction status**

		SVD	Forceps	Vacuum	Caesarean	Total
Labour	Maternal age (yrs)	%	%	%	%	n
Induced	<25	61.5	11.4	9.0	18.0	2,910
	25-34	39.6	19.0	13.4	28.0	9,186
	>34	29.4	19.8	13.0	37.9	1,621
Spont	<25	75.9	8.4	8.3	7.4	10,518
	25-34	57.8	16.5	12.9	12.7	25,359
	>34	44.2	21.5	14.3	19.9	3,523
No labour	<25	0.0	0.0	0.0	100.0	173
	25-34	0.0	0.0	0.0	100.0	1,066
	>34	0.0	0.0	0.0	100.0	492
Total					54,848	

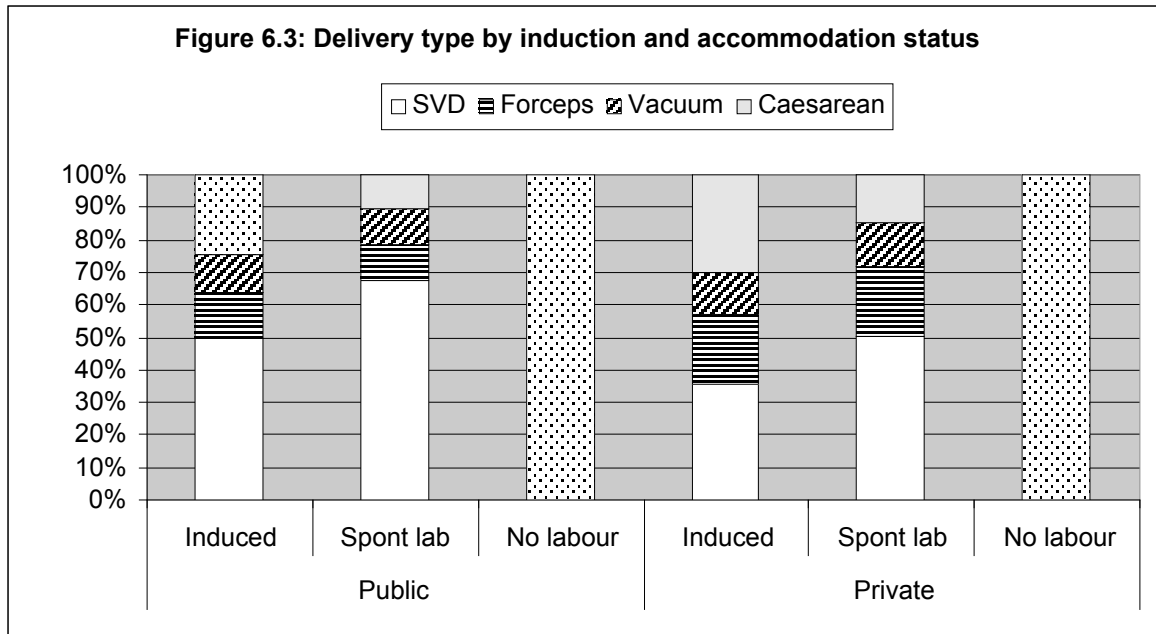


Rates of operative delivery according to whether the labour had been induced or was spontaneous, and then stratified by maternal accommodation status are shown in Table 6.5 and Figure 6.3.

In women who had inductions, forceps delivery rates were higher in private patients than in public patients. Rates of vacuum extraction and caesarean delivery were similar in public and private patients who had inductions.

**Table 6.5: Type of delivery by induction and maternal accommodation status**

		SVD	Forceps	Vacuum	Caesarean	Total
Accom status		%	%	%	%	n
Public	Induced	49.9	13.8	11.6	24.6	7,258
	Spont lab	67.3	11.3	11.0	10.5	25,996
	No labour	0.0	0.0	0.0	100.0	591
Private	Induced	35.3	21.6	13.3	29.8	6,459
	Spont lab	50.0	21.7	13.4	14.8	13,404
	No labour	0.0	0.0	0.0	100.0	1,140
<b>Total</b>						<b>54,848</b>



## 6.4 Epidural analgesia

Women who had epidural analgesia during labour had higher rates of forceps, vacuum extraction and caesarean deliveries (see Table 6.6). The nature of the relationship between epidural analgesia and operative delivery is difficult to determine, because epidural analgesia is often a prerequisite for operative delivery, as well as a risk factor.

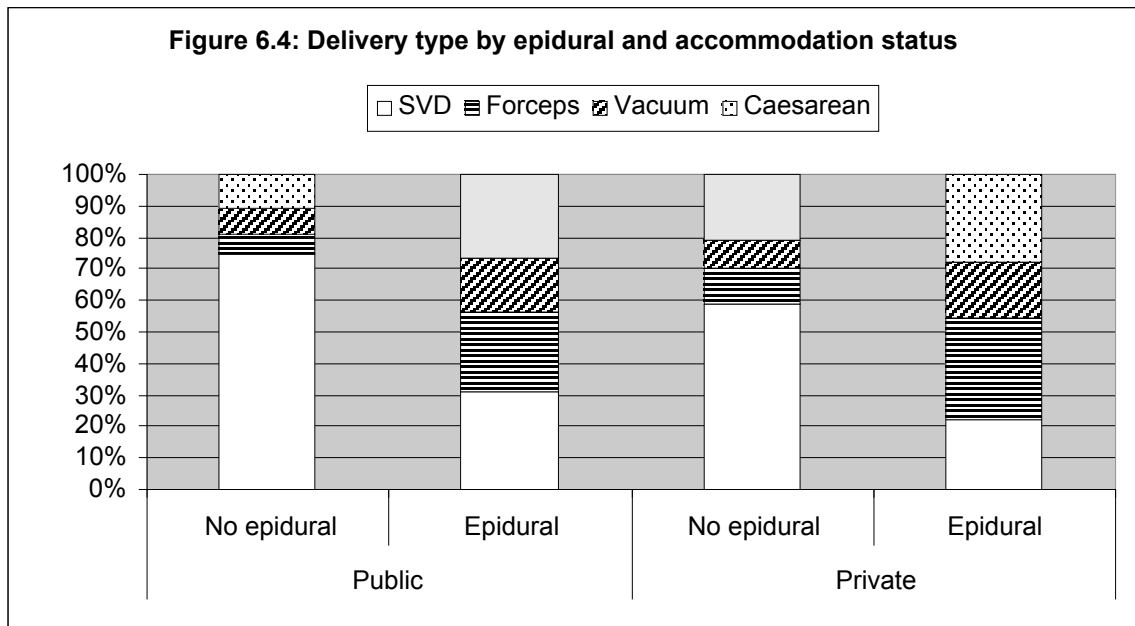
**Table 6.6: Type of delivery by epidural analgesia status**

	SVD	Forceps	Vacuum	Caesarean	Total
Epidural					
No	69.4	8.0	8.6	14.0	36179
Yes	26.7	28.7	17.5	27.2	18662

Rates of forceps delivery were slightly higher amongst private patients who had epidural analgesia, compared to public patients (see Table 6.7 and Figure 6.4). Rates of vacuum extraction and caesarean delivery in women who had epidural analgesia were similar in public and private patients.

**Table 6.7: Type of delivery by epidural and accommodation status**

			SVD	Forceps	Vacuum	Caesarean	Total
Accom status			%	%	%	%	n
Public	Epidural	No	74.7	6.3	8.4	10.6	24319
		Yes	31.0	25.1	17.4	26.5	9525
Private	Epidural	No	58.7	11.3	8.9	21.1	11860
		Yes	22.2	32.4	17.5	27.9	9137

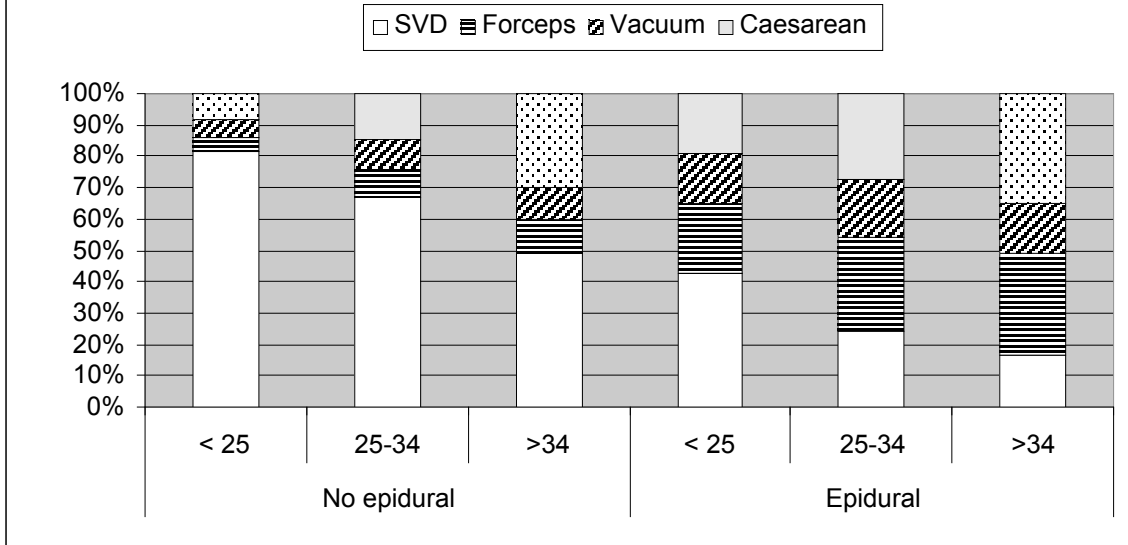


Older women who had epidural analgesia had higher rates of instrumental vaginal delivery and caesarean delivery (see Table 6.8 and Figure 6.5).

**Table 6.8: Delivery type by maternal age and epidural analgesia status**

		<b>SVD</b>	<b>Forceps</b>	<b>Vacuum</b>	<b>Caesarean</b>	<b>Total</b>
Epidural	Maternal age (yrs)	%	%	%	%	n
No	< 25	81.5	4.7	5.8	8.0	10187
	25-34	67.0	9.1	9.5	14.4	22617
	>34	49.2	10.4	10.5	29.9	3375
Yes	< 25	42.9	21.8	15.9	19.4	3413
	25-34	24.2	29.9	18.2	27.7	12989
	>34	16.5	32.3	16.0	35.2	2260

**Figure 6.5: Delivery type by epidural status and maternal age**



## 7. Key points

### ***Trends in first births***

Overall from 1992 to 2002:

- Spontaneous vaginal delivery rates decreased from 61.1% to 52.7%
- Combined operative delivery rates increased from 38.9% to 47.3%
- Instrumental vaginal delivery rates remained constant
- Forceps delivery rates decreased (24.9% to 13.7%) and there was a corresponding increase in vacuum extraction delivery rates (1.9% to 12.7%).
- There were also increases in elective caesarean rates (1.6% to 3.7%) and emergency caesarean rates (10.5% to 17.2%).

When public and private patients were examined separately from 1998 to 2002:

- The spontaneous vaginal delivery rate was 63.0% in public patients and 43.3% in private patients
- Forceps delivery rates declined in both groups
- Vacuum extraction and emergency caesarean delivery rates increased in both groups
- Elective caesarean rates appeared to increase in private patients but not public patients.

Induction rates increased from 16.1% in 1992 to 25.9% in 2002. From 1998 to 2002 there appeared to be a slight increase in induction rates in both public and private patients (public: 17.7% to 21.6%, private: 28.5% to 31.4%).

### ***Trends in second births (1998 to 2002)***

- Spontaneous vaginal deliveries decreased from 91.6% to 88.5%
- Combined operative delivery rates increased from 8.4% to 11.5%
- Instrumental vaginal delivery rates increased from 5.1% to 6.3%
- Trends for the different delivery types were the same as those for first births, ie. A decrease in forceps delivery rates and increases in vacuum extraction, elective caesarean and emergency caesarean delivery rates
- Induction rates increased from 19.9% to 23.4%.

### ***Factors associated with operative delivery in first births (1999 to 2002)***

- Higher proportions of women aged over 34 years had forceps and caesarean deliveries (both elective and emergency), compared to younger women
- Higher proportions of private patients had all types of operative delivery, compared to public patients
- Women who were aged over 34 years and were private patients had much higher rates of elective caesarean deliveries, compared to other women
- Women who had inductions had approximately twice the rate of caesarean delivery, compared to those who had spontaneous labours. Rates of forceps and vacuum delivery were also slightly higher amongst women who had inductions.
- Women aged over 34 years had considerably higher caesarean rates following induction, compared to younger women
- Private patients had higher forceps delivery rates following induction, compared to public patients.
- Women who had epidural analgesia during labour had higher rates of forceps, vacuum extraction and caesarean deliveries

- Forceps delivery rates were slightly higher amongst private patients who had epidural analgesia, compared to public patients.
- Women aged over 34 years who had epidural analgesia had higher rates of instrumental vaginal delivery and caesarean delivery, compared to younger women.

*Comparisons between first births and second births (1999 to 2002)*

- Just over half of the women having first births achieved a spontaneous vaginal delivery (54.9%), whereas in second births spontaneous vaginal delivery occurred in 89.8% of cases
- Overall operative delivery rates were considerably higher in first births (45.1%), compared to second births (10.2%)
- Rates of forceps, vacuum extraction and emergency caesarean deliveries were considerably higher in first births. Rates of elective caesarean deliveries were only slightly higher
- Induction rates were similar in both first and second births.

## APPENDIX: Summary of the validation study of the Perinatal Morbidity Statistics Form 1999

The validation study was undertaken to assess the reliability of data reported on the Perinatal Morbidity Statistics Form used by VPDCU.

The validation involved completing blank forms with data obtained from hospital medical records and comparing them with the forms completed by midwives that had been sent to the VPDCU.

Forms recording births in July 1999 were selected. Twenty randomly selected hospitals took part. A total of 676 randomly selected forms were validated. This was equivalent to approximately 1% of births.

Table 1 lists the data items of interest to this study and shows the number (and percent) of forms that did not match for a particular data item. Table 2 shows the accuracy of recording of procedures and operations; and complications of labour, birth or postnatal.

**Table 1: Discrepancies between the medical record and the form used by VPDCU**

Item	Errors	Percentage
<i>(Number items =Number of forms=676 unless otherwise stated)</i>		
Public/private patient	6	0.8
Birth date (mother)	4	0.5
Total previous pregnancies	(919) 43	4.6
Was last birth a caesarean section?	(66) 0	0
Labour - induced or augmented	(417) 128	30.6
Presentation	2	0.2
Type of birth	6	0.8
Baby's birth weight	4	0.5
Gestation	77	11.3
Plurality	0	0

**Table 2: Recording of complications and procedures**

Condition	Recorded on form	Missed on form	Total validated	% Missed
Complications of labour, birth or postnatal	256	134	390	34.3
Maternal medical conditions	119	76	195	38.9