

## 8. NEONATAL INTENSIVE CARE

The information presented in this chapter was obtained from the Neonatal Intensive Care Units (NICUS) Data Collection (see Chapter 3, Data Sources).

### Registration rate

There were 2,098 infants registered in NICUS in 2003. The most common reasons for registration of an infant were assisted ventilation for four hours or more (46.9 per cent) and gestational age less than 29 weeks (17.0 per cent). Infants generally met more than one of the registration criteria.

The NICUS registration rate in 2003 was 23.2 per 1,000 livebirths, which has increased slightly each year since 1992 (17.9 per 1,000 live births). Table 67 shows the registration rate according to the mothers' health area of residence. The relatively low registration rates from the health areas adjoining the New South Wales border reflect the fact that some infants are preferentially referred interstate. The registration rate in health areas with low numbers of births should be interpreted with caution.

Sixty-four of the 2,098 infants (3.1 per cent) registered in NICUS were born to Aboriginal or Torres Strait Islander mothers. There were 2,219 livebirths to Aboriginal or Torres Strait Islander women recorded by the NSW and ACT Midwives Data Collections for 2003. The registration rate for these infants was 28.8 per 1,000 livebirths and has increased since 1992. Sixty-two of the 1,933 mothers (3.2 per cent) were Aboriginal or Torres Strait Islander, of whom 23 (37.1 per cent) were residents of the Greater Western and North Coast Health Areas (Table 69). Seventeen of the 341 mothers (5.0 per cent) of infants less than 29 weeks and/or less than 1,000 grams were Aboriginal or Torres Strait Islander.

### Maternal characteristics

There were 1,933 mothers of the 2,098 infants registered in NICUS during 2003. Nearly 80 per cent of the mothers were residents of the Sydney South West, Sydney West, Hunter & New England, Northern Sydney & Central Coast, and South Eastern Sydney & Illawarra Health Areas (Table 68). The distribution of the mothers' health area of residence for infants less than 29 weeks and/or less than 1,000 grams was similar to those for the whole group. Of the 341 mothers of infants in this group just over three quarters (82.7 per cent) were residents of the Sydney South West, Sydney West, Hunter & New England, Northern Sydney & Central Coast, and South Eastern Sydney & Illawarra Health Areas.

The age of mothers of NICUS infants ranged from 15 to 46 years, with a mean age of 29.8 years. The mean maternal age was similar across all gestational age groups and has remained constant since 1992. In 2003, 22.0 per cent of mothers were aged 35 years or more (range 13.7 per cent in 1992 to 22.0 per cent in 2003). In 2003, 5.2 per cent of mothers were aged less than 20 years (range 5.0 per cent in 1999 to 6.8 per cent in 2000) (Table 69). The health area of residence with the highest proportion of teenage mothers was Greater Western.

There were 1,684 mothers (87.1 per cent) who had an antenatal complication. The most common antenatal complications were preterm labour (44.4 per cent), pregnancy induced hypertension (17.1 per cent), fetal distress (16.9 per cent), antepartum haemorrhage (16.0 per cent), and intrauterine growth restriction (10.5 per cent). Antenatal complications were more frequent in mothers delivering at less than 37 weeks compared with at term. Even so, 56.3 per cent of mothers giving birth at term had an antenatal complication (Table 70).

**TABLE 67**

#### NICUS REGISTRATIONS BY HEALTH AREA OF RESIDENCE, NSW & ACT 2003

Health Area	Total NICUS registrants		Total NSW & ACT live births No.	Registrants per 1,000 live births
	No.	%		
Sydney South West	496	23.6	19607	25.3
South Eastern Sydney & Illawarra	257	12.3	14081	18.3
Sydney West	393	18.7	16113	24.4
Northern Sydney & Central Coast	256	12.2	13278	19.3
Hunter & New England	299	14.3	9809	30.5
North Coast	55	2.6	4496	12.2
Greater Southern	117	5.6	4519	25.9
Greater Western	107	5.1	3963	27.0
ACT	107	5.1	3901	27.4
Interstate	8	0.4	587	13.6
Overseas	3	0.1	0	-
Not stated	0	0.0	18	-
TOTAL	2098	100.0	90372	23.2

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research. NSW Midwives Data Collection 2003. Centre for Epidemiology and Research, NSW Department of Health. ACT Maternal-Perinatal Data Collection, 2001.

Administration of corticosteroids to the mother prior to preterm birth improves the outcome for the infant. In 2003, 86.2 per cent of mothers of infants born at less than 28 weeks received corticosteroids (Figure 5, Table 71). Nearly

eighty-seven per cent of mothers of 28–31 week gestation infants received antenatal corticosteroids. The overall proportion of mothers receiving antenatal corticosteroids increased from 45 per cent in 1992 to 74.1 per cent in 2001.

**TABLE 68**

**MOTHERS OF NICUS REGISTRANTS BY HEALTH AREA OF RESIDENCE AND ABORIGINALITY, NSW & ACT 2003**

Health Area	Non-Aboriginal		Aboriginal		TOTAL	
	No.	%	No.	%	No.	%
Sydney South West	447	98.5	7	1.5	454	23.5
South Eastern Sydney & Illawarra	231	98.3	4	1.7	235	12.2
Sydney West	359	98.4	6	1.6	365	18.9
Northern Sydney & Central Coast	232	98.7	3	1.3	235	12.2
Hunter & New England	262	95.3	13	4.7	275	14.2
North Coast	45	90.0	5	10.0	50	2.6
Greater Western	80	81.6	18	18.4	98	5.1
Greater Southern	103	95.4	5	4.6	108	5.6
ACT	101	99.0	1	1.0	102	5.3
Interstate	8	5.4	0	0.0	8	0.4
Overseas	3	100.0	0	0.0	3	0.2
TOTAL	1871	96.8	62	3.2	1933	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

**TABLE 69**

**MOTHERS OF NICUS REGISTRANTS BY HEALTH AREA OF RESIDENCE AND MATERNAL AGE, NSW & ACT 2003**

Health Area	Maternal age (years)						TOTAL	
	Less than 20		20–34		35+		No.	%
	No.	%	No.	%	No.	%		
Sydney South West	25	5.5	331	72.9	98	21.6	454	23.5
South Eastern Sydney & Illawarra	12	5.1	161	68.5	62	26.4	235	12.2
Sydney West	24	6.6	258	70.7	83	22.7	365	18.9
Northern Sydney & Central Coast	4	1.7	163	69.4	68	28.9	235	12.2
Hunter & New England	15	5.5	218	79.3	42	15.3	275	14.2
North Coast	3	6.0	36	72.0	11	22.0	50	2.6
Greater Southern	5	4.6	79	73.1	24	22.2	108	5.6
Greater Western	11	11.2	74	75.5	13	13.3	98	5.1
ACT	2	2.0	79	77.5	21	20.8	102	5.4
Interstate	0	0.0	5	62.5	3	37.5	8	4.1
Overseas	0	0.0	3	100.0	0	0.0	3	0.2
TOTAL	101	5.2	1407	72.8	425	22.0	1933	100.0

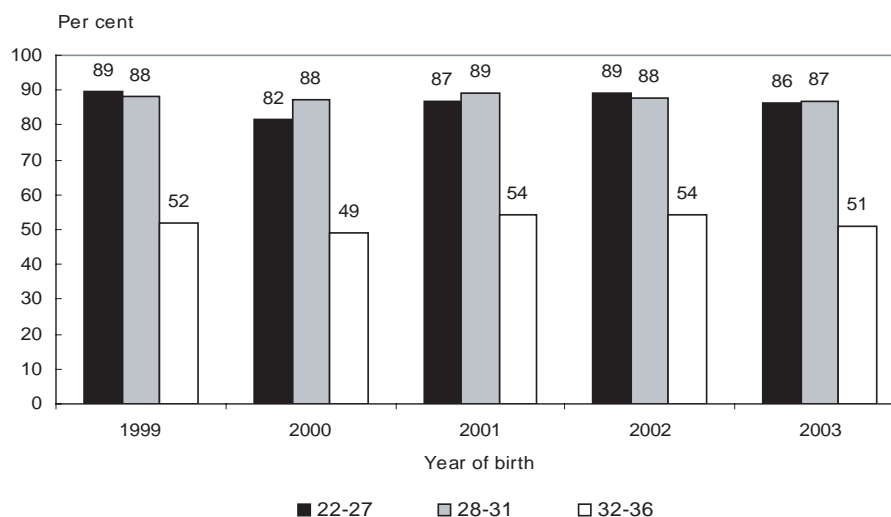
Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

**TABLE 70**

**MOTHERS OF NICUS REGISTRANTS BY ANTENATAL COMPLICATIONS AND GESTATIONAL AGE, NSW & ACT 2003**

Antenatal complication	Gestational age (weeks)										TOTAL	
	22–27		28–31		32–36		37–41		42+		No.	%
	No.	%	No.	%	No.	%	No.	%	No.	%		
Preterm labour	172	78.9	324	62.7	351	55.9	12	2.2	0	0.0	859	44.4
Antepartum haemorrhage	65	29.8	118	22.8	108	17.2	18	3.2	0	0.0	309	16.0
Chorioamnionitis	53	24.3	48	9.3	20	3.2	5	0.9	0	0.0	126	6.5
Fetal distress	41	18.8	72	13.9	98	15.6	111	20.0	4	28.6	326	16.9
Pregnancy induced hypertension	27	12.4	122	23.6	146	23.2	35	6.3	0	0.0	330	17.1
Intrauterine growth restriction	24	11.0	64	12.4	83	13.2	32	5.8	0	0.0	203	10.5
Fetal diagnosis of anomaly	3	1.4	9	1.7	31	4.9	81	14.6	1	7.1	125	6.5
Gestational diabetes	3	1.4	26	5.0	47	7.5	28	5.0	0	0.0	104	5.4
Any complication	218	100.0	517	100.0	628	100.0	315	56.7	6	42.9	1684	87.1
TOTAL MOTHERS	218	100.0	517	100.0	628	100.0	556	100.0	14	100.0	1933	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

**FIGURE 5****MOTHERS OF NICUS REGISTRANTS BY ANTENATAL CORTICOSTEROID ADMINISTRATION AND GESTATIONAL AGE, NSW & ACT 1999–2003**

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

**TABLE 71****MOTHERS OF NICUS REGISTRANTS BY ANTENATAL CORTICOSTEROID ADMINISTRATION AND GESTATIONAL AGE, NSW & ACT 1999–2003**

Year	Corticosteroid administration	Gestational age (weeks)						TOTAL	
		22–27		28–31		32–36		No.	%
		No.	%	No.	%	No.	%	No.	%
1999	No	27	10.6	57	12.0	273	47.9	357	27.4
	Yes	228	89.4	419	88.0	297	52.1	944	72.6
	TOTAL	255	100.0	476	100.0	570	100.0	1301	100.0
2000	No	45	18.5	64	12.5	287	50.9	396	30.0
	Yes	198	81.5	449	87.5	277	49.1	924	70.0
	TOTAL	243	100.0	513	100.0	564	100.0	1320	100.0
2001	No	33	13.3	57	10.7	260	45.6	350	25.9
	Yes	215	86.7	474	89.3	310	54.4	999	74.1
	TOTAL	248	100.0	531	100.0	570	100.0	1349	100.0
2002	No	27	10.8	63	12.3	279	45.7	369	26.9
	Yes	224	89.2	449	87.7	331	54.3	1004	73.1
	TOTAL	251	100.0	512	100.0	610	100.0	1373	100.0
2003	No	30	13.8	68	13.2	307	48.9	405	29.7
	Yes	188	86.2	449	86.8	321	51.1	958	70.3
	TOTAL	218	100.0	517	100.0	628	100.0	1363	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

## Transfer status, labour and delivery

Infants are admitted to a neonatal intensive care unit after:

- delivery that has been booked to occur in a tertiary centre;
- delivery in a tertiary centre following maternal transfer;
- delivery in a non-tertiary centre followed by infant transfer to a tertiary centre.

Thirty-six per cent of all births were booked at a tertiary centre, ranging from 32.8 per cent for the 28–31 week gestational age group to 40.4 per cent for the 32–36 weeks gestational age group (Table 72). Maternal transfer was most common at gestations less than 32 weeks. The rate of maternal transfer was similar for infants born before 28 weeks gestation (54.0 per cent) and for those born at 28–31 weeks gestation (55.9 per cent). The overall rate of maternal transfer was 32.7 per cent.

Nearly thirty-one per cent of infants were transferred to a tertiary centre following birth. There were 5.3 per cent (111/2,098) of infants transferred from one tertiary centre to another during the first day of life for assisted ventilation and/or major surgery. Transfer following birth was most common in the 37-plus weeks gestational age group (61.5 per cent). Forty-one infants (52/1,244; 4.2 per cent) greater than 31 weeks gestation were discharged home prior to the admission that qualified them for registration in NICUS.

The inverse relationship between gestational age groups and the proportion of births in a tertiary centre is shown in Figure 6 and Table 73. The proportion of infants born in a tertiary centre increased from 60.0 per cent in 1992 to 74.8 per cent 2000. In 2003, 88.6 per cent of infants less than 32 weeks gestation were born in a tertiary centre

compared with 71.8 per cent of 32–36 week gestation infants and 48.3 per cent of term infants.

The pattern of transfer status (Table 74) and place of birth by birthweight (Table 75) is similar to that of gestational age, with the majority (88.9 per cent) of the very low birthweight infants (less than 1,500 grams) born in a tertiary centre.

Spontaneous onset of labour was more common among mothers of infants less than 28 weeks gestation (Table 76). Augmentation and induction of labour were most common in term and post-term births. Similarly spontaneous onset of labour occurred in half (50.3 per cent) of all mothers of infants less than 2,500 grams birthweight (Table 77). As expected, augmentation, or induction of labour was most common in mothers of infants with a birthweight of 2,500 grams or more (39.0 per cent).

Prolonged rupture of membranes (greater than 24 hours) was more common at lower gestations, affecting 12.1 per cent of infants less than 28 weeks gestation (Table 78).

The proportion of mothers who gave birth by elective caesarean section (caesarean section without labour) increased from 27.0 per cent in 1992 to 38.4 per cent in 2003 (Table 79). The most common type of delivery was caesarean section (45.8 per cent in 1993 to 56.0 per cent in 2003), followed by normal vaginal delivery (41.9 per cent in 1993 to 35.6 per cent in 2003) and vaginal breech delivery (7.0 per cent in 1998 to 4.2 per cent in 2003) (Table 80). The high rate of caesarean section and breech delivery in the NICUS cohort is related to the high proportion of preterm births. The rate of caesarean section in term and post-term births was 43.4 per cent, compared with 24.0 per cent for all livebirths in NSW in 2003.

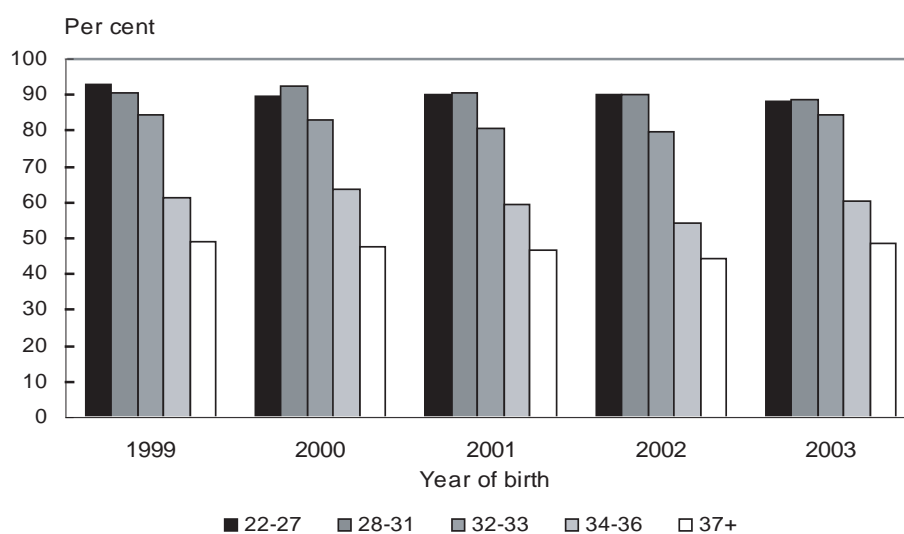
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**TABLE 72**

**NICUS REGISTRANTS BY BOOKING STATUS, TRANSFER STATUS AND GESTATIONAL AGE, NSW & ACT 2003**

Booking status and transfer status	Gestational age (weeks)										TOTAL	
	22–27		28–31		32–36		37–41		42+		No.	%
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Booked at tertiary hospital	85	34.3	199	32.8	272	40.4	183	32.9	5	35.7	744	35.5
Transfer before birth	134	54.0	339	55.9	190	28.2	23	4.1	0	0.0	686	32.7
Transfer after birth	29	11.7	65	10.7	199	29.6	343	61.6	8	57.1	644	30.7
Booked at non tertiary hospital	0	0.0	3	0.5	12	1.8	8	1.4	1	7.1	24	1.1
TOTAL	248	100.0	606	100.0	673	100.0	557	100.0	14	100.0	2098	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

**FIGURE 6****NICUS REGISTRANTS BY TERTIARY HOSPITAL BIRTH AND GESTATIONAL AGE, NSW & ACT 1999-2003**

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

**TABLE 73****NICUS REGISTRANTS BY PLACE OF BIRTH (LEVEL OF OBSTETRIC HOSPITAL) AND GESTATIONAL AGE, NSW & ACT 2003**

Place of birth	Gestational age (weeks)										TOTAL	
	22-27		28-31		32-33		34-36		37+			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Level 1-4	18	7.3	46#	7.6	33	10.3	118	33.5	247	43.3	462	22.0
Level 5	10	4.0	20#	3.3	14	4.4	22	6.3	45	7.9	111	5.3
Level 6	220	88.7	538#	88.8	271	84.4	212	60.2	276	48.3	1517	72.3
Planned home birth	0	0.0	0	0.0	0	0.0	0	0.0	3	0.5	3	0.1
Born before arrival	0	0.0	2#	0.3	3	0.9	0	0.0	0	0.0	5	0.2
TOTAL	248	100.0	606	100.0	321	100.0	352	100.0	571	100.0	2098	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

# 35/68 (51.5%) babies not born in a level six hospital were 30-31 weeks gestation.  
355/538 (66.0%) babies born in a level six hospital were 30-31 weeks gestation.

**TABLE 74****NICUS REGISTRANTS BY BOOKING STATUS, TRANSFER STATUS AND BIRTHWEIGHT, NSW & ACT 2003**

Booking status and transfer status	Birthweight (grams)								TOTAL	
	Less than 1,000		1,000-1,499		1,500-2,499		2,500+			
	No.	%	No.	%	No.	%	No.	%	No.	%
Booked at tertiary hospital	88	33.6	156	34.6	238	36.3	262	35.9	744	35.5
Transfer before birth	149	56.9	241	53.4	263	40.2	33	4.5	686	32.7
Transfer after birth	25	9.5	50	11.1	147	22.4	422	57.8	644	30.7
Booked at non tertiary hosp.	0	0.0	4	0.9	7	1.1	13	1.8	24	1.1
TOTAL	262	100.0	451	100.0	655	100.0	730	100.0	2098	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

**TABLE 75****NICUS REGISTRANTS BY PLACE OF BIRTH (LEVEL OF OBSTETRIC HOSPITAL) AND BIRTHWEIGHT, NSW & ACT 2003**

Place of birth	Birthweight (grams)									
	Less than 1,000		1,000–1,499		1,500–2,499		2,500+		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%
Level 1–4	18	6.9	32	7.1	107	16.3	305	41.8	462	22.0
Level 5	7	2.7	20	4.4	26	4.0	58	7.9	111	5.3
Level 6	237	90.5	397	88.0	518	79.1	365	50.0	1517	72.3
Planned home birth	0	0.0	0	0.0	1	0.2	2	0.3	3	0.1
Born before arrival	0	0.0	2	0.4	3	0.5	0	0.0	5	0.2
TOTAL	262	100.0	451	100.0	655	100.0	730	100.0	2098	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

**TABLE 76****MOTHERS OF NICUS REGISTRANTS BY ONSET OF LABOUR AND GESTATIONAL AGE, NSW & ACT 2003**

Onset of labour	Gestational age (weeks)											
	22–27		28–31		32–36		37–41		42+		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Spontaneous	148	67.9	272	52.6	269	42.8	241	43.3	5	35.7	935	48.4
Augmented	8	3.7	11	2.1	25	4.0	46	8.3	1	7.1	91	4.7
Induced	2	0.9	10	1.9	45	7.2	118	21.2	7	50.0	182	9.4
No labour	60	27.5	224	43.3	289	46.0	151	27.2	1	7.1	725	37.5
TOTAL	218	100.0	517	100.0	628	100.0	556	100.0	14	100.0	1933	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

**TABLE 77****MOTHERS OF NICUS REGISTRANTS BY ONSET OF LABOUR AND BIRTHWEIGHT, NSW & ACT 2003**

Onset of labour	Birthweight (grams)									
	Less than 1,000		1,000–1,499		1,500–2,499		2,500+		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%
Spontaneous	121	54.0	176	45.8	309	51.8	329	45.1	935	48.4
Augmented	7	3.1	6	1.6	26	4.4	52	7.1	91	4.7
Induced	1	0.4	11	2.9	38	6.4	132	18.1	182	9.4
No labour	95	42.4	191	49.7	223	37.4	216	29.6	725	37.5
TOTAL	224	100.0	384	100.0	596	100.0	729	100.0	1933	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

**TABLE 78****NICUS REGISTRANTS BY DURATION OF RUPTURE OF MEMBRANES AND GESTATIONAL AGE, NSW & ACT 2003**

Duration of rupture of Membranes	Gestational age (weeks)											
	22–27		28–31		32–36		37–41		42+		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Less than 24 hours	185	74.6	503	83.0	598	88.9	527	94.6	13	92.9	1826	87.0
24 hours–7 days	30	12.1	60	9.9	50	7.4	29	5.2	1	7.1	170	8.1
8+ days	33	13.3	43	7.1	25	3.7	1	0.2	0	0.0	102	4.9
TOTAL	248	100.0	606	100.0	673	100.0	557	100.0	14	100.0	2098	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

**TABLE 79****NICUS REGISTRANTS BY TYPE OF DELIVERY AND GESTATIONAL AGE, NSW & ACT 2003**

Type of delivery	Gestational age (weeks)										TOTAL	
	22-27		28-31		32-36		37-41		42+			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Normal vaginal	91	36.7	194	32.0	195	29.0	258	46.3	9	64.3	747	35.6
Forceps	0	0.0	9	1.5	14	2.1	17	3.1	0	0.0	40	1.9
Forceps rotation	0	0.0	0	0.0	3	0.4	2	0.4	0	0.0	5	0.2
Vacuum extraction	0	0.0	2	0.3	8	1.2	32	5.7	1	7.1	43	2.0
Vaginal breech	33	13.3	32	5.3	20	3.0	4	0.7	0	0.0	89	4.2
Elective Caesarean	69	27.8	257	42.4	318	47.3	161	28.9	1	7.1	806	38.4
Emergency Caesarean	55	22.2	112	18.5	115	17.1	83	14.9	3	21.4	368	17.5
TOTAL	248	100.0	606	100.0	673	100.0	557	100.0	14	100.0	2098	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

**TABLE 80****NICUS REGISTRANTS BY TYPE OF DELIVERY AND BIRTHWEIGHT, NSW & ACT 2003**

Type of delivery	Birthweight (grams)								TOTAL	
	Less than 1,000		1,000-1,499		1,500-2,499		2,500+			
	No.	%	No.	%	No.	%	No.	%	No.	%
Normal vaginal	70	26.7	122	27.1	223	34.0	332	45.5	747	35.6
Forceps	0	0.0	2	0.4	17	2.6	21	2.9	40	1.9
Forceps rotation	0	0.0	0	0.0	3	0.5	2	0.3	5	0.2
Vacuum extraction	0	0.0	1	0.2	5	0.8	37	5.1	43	2.0
Vaginal breech	35	13.4	27	6.0	21	3.2	6	0.8	89	4.2
Elective Caesarean	110	42.0	220	48.8	249	38.0	227	31.1	806	38.4
Emergency Caesarean	47	17.9	79	17.5	137	20.9	105	14.4	368	17.5
TOTAL	262	100.0	451	100.0	655	100.0	730	100.0	2098	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

(Continued from page 58)

### Infant characteristics

Nearly three quarters of the infants (72.8 per cent) were preterm (less than 37 weeks gestation), 40.7 per cent were very preterm (less than 32 weeks gestation) and 11.8 per cent were extremely preterm (less than 28 weeks gestation) (Figure 7). The proportion of infants in each gestational age group has remained relatively constant (Table 81). Almost all liveborn infants at 24-31 weeks gestation were admitted to a NICU, about two-thirds at 32 weeks gestation, and one-fifth at 33-34 weeks gestation (Table 82).

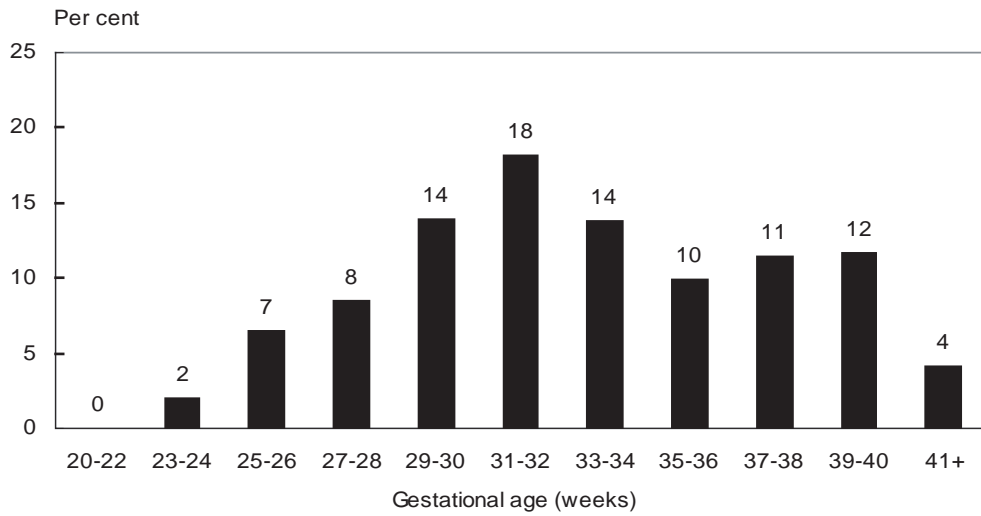
Sixty-five per cent of infants had a low birthweight (less than 2,500 grams), 34.0 per cent had a very low birthweight (less than 1,500 grams) and 12.5 per cent had an extremely

low birthweight (less than 1,000 grams). The proportion of infants in each birthweight group has remained constant (Table 83). Almost all liveborn infants 600-1500 grams birthweight were admitted to a NICU (Table 84).

Overall, 56.1 per cent of infants were male. The ratio of males to females was approximately 3:2 in most gestational age groups (Table 85).

The overall proportion of the infants who had a major congenital anomaly decreased from 22.0 per cent in 1992 to 14.8 per cent in 2003. Congenital anomalies were more common among term infants (37-plus weeks gestational age), of whom 35.0 per cent had a major congenital anomaly and 3.7 per cent had a minor congenital anomaly (Table 86).

*Continued on page 65*

**FIGURE 7****NICUS REGISTRANTS BY GESTATIONAL AGE, NSW & ACT 2003**

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

**TABLE 81****NICUS REGISTRANTS BY GESTATIONAL AGE, NSW & ACT 1999-2003**

Gestational age (weeks)	1999		2000		Year of birth 2001		2002		2003	
	No.	%	No.	%	No.	%	No.	%	No.	%
22-27	290	14.6	275	13.7	275	13.7	281	14.0	248	11.8
28-31	551	27.7	606	30.2	642	32.0	604	30.0	606	28.9
32-36	623	31.3	601	30.0	611	30.4	640	31.8	673	32.1
37-41	512	25.7	512	25.5	472	23.5	478	23.8	557	26.5
42+	16	0.8	10	0.5	9	0.4	8	0.4	14	0.7
TOTAL	1992	100.0	2004	100.0	2009	100.0	2011	100.0	2098	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.



**TABLE 82****BIRTHS BY NICUS REGISTRATION AND GESTATIONAL AGE, NSW & ACT 2003**

Gestational age (weeks)	NSW & ACT		Registrations No.	NICUS Rate per 1,000 live births	% of cohort
	Stillbirths No.	Live births No.			
Less than 21	45	16	0	0.0	0.0
21	69	17	0	0.0	0.0
22	48	44	0	0.0	0.0
23	36	26	12	461.5	0.6
24	28	52	30	576.9	1.4
25	14	57	57	1000.0	2.7
26	27	80	80	1000.0	3.8
27	16	69	69	1000.0	3.3
28	17	115	108	939.1	5.2
29	12	121	108	892.6	5.2
30	9	184	183	994.6	8.7
31	14	221	207	936.7	9.8
32	15	304	175	575.7	8.3
33	12	454	146	321.6	7.0
34	15	759	144	189.7	6.9
35	16	1197	104	86.9	5.0
36	29	2313	104	45.0	5.0
37	31	5012	97	19.4	4.6
38	24	14134	143	10.1	6.8
39	28	20899	115	5.5	5.5
40	30	26869	129	4.8	6.2
41	18	15229	73	4.8	3.5
42	4	2026	14	6.9	0.7
43	0	169	0	0.0	0.0
Not stated	0	5	0	0.0	0.0
TOTAL	558	90372	2098	23.2	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research, 2003. NSW Midwives Data Collection 2003. Centre for Epidemiology and Research, NSW Department of Health. ACT Maternal-Perinatal Data Collection, 2001.

**TABLE 83****NICUS REGISTRANTS BY BIRTHWEIGHT, NSW & ACT 1999-2003**

Birthweight (grams)	Year of birth									
	1999		2000		2001		2002		2003	
	No.	%	No.	%	No.	%	No.	%	No.	%
Less than 400	3	0.2	1	0.0	2	0.1	1	0.0	1	0.0
400-499	9	0.5	6	0.3	5	0.2	7	0.3	9	0.4
500-599	25	1.3	21	1.0	30	1.5	21	1.0	23	1.1
600-699	51	2.6	56	2.8	49	2.4	53	2.6	38	1.8
700-799	62	3.1	62	3.1	49	2.4	63	3.1	53	2.5
800-899	75	3.8	53	2.6	72	3.6	58	2.9	59	2.8
900-999	58	2.9	84	4.2	63	3.1	81	4.0	79	3.8
1,000-1,249	210	10.5	212	10.6	219	10.9	181	9.0	197	9.4
1,250-1,499	247	12.4	280	14.0	274	13.6	263	13.1	254	12.1
1,500-1,749	207	10.4	203	10.1	231	11.5	228	11.3	214	10.2
1,750-1,999	151	7.6	144	7.2	159	7.9	163	8.1	184	8.8
2,000-2,499	242	12.1	253	12.6	251	12.5	273	13.6	257	12.2
2,500-2,999	211	10.6	201	10.0	215	10.7	205	10.2	243	11.6
3,000-3,499	205	10.3	200	10.0	195	9.7	195	9.7	229	10.9
3,500-3,999	153	7.7	149	7.4	132	6.6	157	7.8	172	8.2
4,000+	83	4.2	79	3.9	63	3.1	62	3.1	86	4.1
TOTAL	1992	100.0	2004	100.0	2009	100.0	2011	100.0	2098	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

**TABLE 84****BIRTHS BY NICUS REGISTRATION AND BIRTHWEIGHT, NSW & ACT 2003**

Birthweight (grams)	NSW & ACT			NICUS Rate per 1,000 live births	% of cohort
	Stillbirths No.	Live births No.	Registrations No.		
Less than 400	134	54	1	18.5	0.1
400-499	57	43	9	209.3	0.4
500-599	52	54	23	425.9	1.1
600-699	24	51	38	745.1	1.8
700-799	15	57	53	929.8	2.5
800-899	7	63	59	936.5	2.8
900-999	13	83	79	951.8	3.8
1,000-1,249	19	211	197	933.6	9.4
1,250-1,499	23	288	254	881.9	12.1
1,500-1,749	18	409	214	523.2	10.2
1,750-1,999	15	680	184	270.6	8.8
2,000-2,499	45	3343	257	76.9	12.3
2,500-2,999	53	13456	243	18.1	11.6
3,000-3,499	46	32264	229	7.1	10.9
3,500-3,999	23	28437	172	6.0	8.2
4,000+	12	10869	86	7.9	4.1
Not stated	2	10	0	0.0	0.0
TOTAL	558	90372	2098	23.2	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research, 2003. NSW Midwives Data Collection 2003. Centre for Epidemiology and Research, NSW Department of Health. ACT Maternal-Perinatal Data Collection, 2001.

**TABLE 85****NICUS REGISTRANTS BY GENDER AND GESTATIONAL AGE, NSW & ACT 2003**

Sex	Gestational age (weeks)										TOTAL	
	22-27		28-31		32-36		37-41		42+		No.	%
	No.	%	No.	%	No.	%	No.	%	No.	%		
Male	125	50.4	333	55.0	380	56.5	334	60.0	5	35.7	1177	56.1
Female	123	49.6	273	45.0	293	43.5	223	40.0	9	64.3	921	43.9
TOTAL	248	100.0	606	100.0	673	100.0	557	100.0	14	100.0	2098	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

**TABLE 86****NICUS REGISTRANTS BY CONGENITAL ANOMALIES AND GESTATIONAL AGE, NSW & ACT 2003**

Congenital anomaly	Gestational age (weeks)										TOTAL	
	22-27		28-31		32-36		37-41		42+		No.	%
	No.	%	No.	%	No.	%	No.	%	No.	%		
None	225	90.7	561	92.6	591	87.8	339	60.9	11	78.6	1727	82.3
Minor	5	2.0	17	2.8	17	2.5	20	3.6	1	7.1	60	2.9
Major	18	7.3	28	4.6	65	9.7	198	35.5	2	14.3	311	14.8
TOTAL	248	100.0	606	100.0	673	100.0	557	100.0	14	100.0	2098	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

(Continued from page 61)

The overall proportion of infants born following a multiple pregnancy was 20.1 per cent in 2003 (range 14.5 per cent in 1993 to 22.4 per cent in 2001). In 2003, most of the infants (79.9 per cent) were from a singleton pregnancy, 17.8 per cent were from a twin pregnancy, 2.0 per cent were from a triplet pregnancy and 0.2 per cent were from a quadruplet pregnancy. Infants born as a result of a multiple gestation were more likely to be preterm, with 26.6 per cent of infants less than 37 weeks gestation being from a multiple gestation pregnancy (Table 87). Multiple births represented 3.2 per cent of all NSW/ACT livebirths in 2003. The higher than expected rate of multiple births among the 2003 NICUS cohort reflects the high proportion of multiple pregnancies resulting in preterm birth.

Table 88 shows the median, 25th and 75th percentiles for one- and five-minute Apgar scores according to gestational age groups. For infants 32-42 weeks gestational age, the median one-minute Apgar score was eight. The median five-minute score was nine for infants 28-42 weeks gestational age. The proportion of infants with a one-minute Apgar score of 0-4 has decreased from 38.7 per cent in 1992 to 22.4 per cent in 2003. Similarly the proportion of infants with a five-minute Apgar score of 0-4 has decreased from 10.8 per cent in 1992 to 5.2 per cent in 2003 (Table 89).

Infants with major congenital anomalies ( $n=311$ ) were excluded from the analysis of morbidity and mortality.

The majority of infants without a major congenital anomaly (1,513/1,787; 84.7 per cent) in the 2003 NICUS cohort received assisted ventilation (intermittent mandatory ventilation and/or continuous positive airways pressure) (Table 90).

The main indication for assisted ventilation for most infants was respiratory distress syndrome (Figure 8). The main indication for assisted ventilation varied with gestational age. Respiratory distress syndrome, immature lung, and transient tachypnoea were more common in the preterm groups, whereas perinatal asphyxia, meconium aspiration, pulmonary hypertension and apnoea were more common in term infants (Figure 8, Table 91).

Proven systemic infection has decreased from 21.5 per cent in 1992 to 10.5 per cent of infants in 2003. Infection was most common among infants less than 28 weeks gestation (33.9 per cent) (Table 92).

The overall proportion of ventilated infants who received surfactant was 41.4 in 2003 (range 33.8 per cent in 1992 to 51.8 per cent in 1998) (Table 93). In 2003, 52.9 per cent of the infants who received surfactant were less than 32 weeks gestational age. The majority (58.7 per cent) of ventilated infants with a diagnosis of respiratory distress syndrome received surfactant.

Overall, the incidence of treated patent ductus arteriosus (PDA) was 14.5 per cent in 2003 (range 10.7 in 1994 to 15.5 per cent in 2000). In 2003, 97.0 per cent of the infants treated for PDA were less than 32 weeks gestational age (Table 94). The majority of infants with a PDA requiring treatment received indomethacin only (12.9 per cent). Surgical treatment of PDA was predominantly performed on infants less than 28 weeks gestation (7.0 per cent). Some infants (1.1 per cent) were treated with both indomethacin and surgery.

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**TABLE 87**

**NICUS REGISTRANTS BY PLURALITY AND GESTATIONAL AGE, NSW & ACT 2003**

Plurality	Gestational age (weeks)										TOTAL	
	22-27		28-31		32-36		37-41		42+			
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Singleton	183	73.8	432	71.3	506	75.2	542	97.3	14	100.0	1677	79.9
Twins	62	25.0	148	24.4	149	22.1	15	2.7	0	0.0	374	17.8
Triplets	3	1.2	26	4.3	14	2.1	0	0.0	0	0.0	43	2.0
Quads	0	0.0	0	0.0	4	0.6	0	0.0	0	0.0	4	0.2
TOTAL	248	100.0	606	100.0	673	100.0	557	100.0	14	100.0	2098	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

**TABLE 88****NICUS REGISTRANTS BY APGAR SCORE AND GESTATIONAL AGE, NSW & ACT 2003**

Apgar Score	Gestational age (weeks)							
	22-27		28-31		32-36		37+	
	Median (25%,75%)		Median (25%,75%)		Median (25%,75%)		Median (25%,75%)	
One-minute Apgar	5	(4,6)	7	(5,8)	7	(5,9)	8	(5,9)
Five-minute Apgar	8	(6,8)	9	(8,9)	9	(8,9)	9	(7,9)

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

**TABLE 89****NICUS REGISTRANTS BY APGAR SCORE AT ONE AND FIVE MINUTES, NSW & ACT 1999-2003**

Apgar Score	Year of birth									
	1999		2000		2001		2002		2003	
	No.	%	No.	%	No.	%	No.	%	No.	%
One minute										
0-4	531	26.7	509	25.4	516	25.7	473	23.5	470	22.4
5-7	689	34.6	744	37.1	744	37.0	690	34.3	746	35.6
8+	766	38.5	737	36.8	734	36.5	830	41.3	881	42.0
Not stated	6	0.3	14	0.7	15	0.7	18	0.9	1	0.0
TOTAL	1992	100.0	2004	100.0	2009	100.0	2011	100.0	2098	100.0
Five minutes										
0-4	132	6.6	154	7.7	143	7.1	139	6.9	109	5.2
5-7	437	21.9	399	19.9	425	21.2	393	19.5	377	18.0
8+	1417	71.1	1438	71.8	1428	71.1	1466	72.9	1610	76.7
Not stated	6	0.3	13	0.6	13	0.6	13	0.6	2	0.1
TOTAL	1992	100.0	2004	100.0	2009	100.0	2011	100.0	2098	100.0

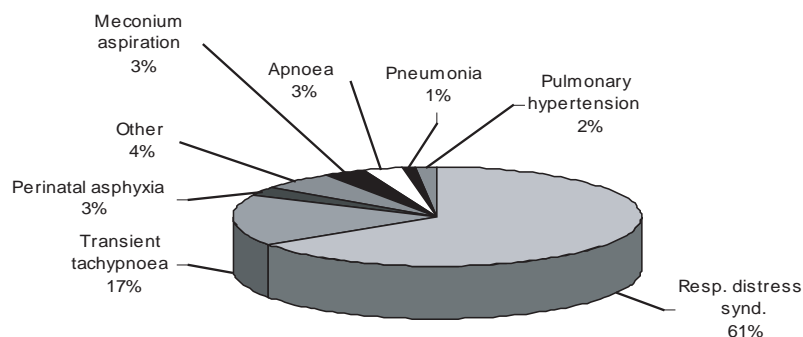
Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research

**TABLE 90****NICUS REGISTRANTS BY ASSISTED VENTILATION BY GESTATIONAL AGE, NSW & ACT 1999-2003#**

Year	Assisted ventilation	Gestational age (weeks)									
		22-27		28-31		32-36		37+		TOTAL	
		No.	%	No.	%	No.	%	No.	%	No.	%
1999	No	1	0.4	119	22.8	60	11.5	9	3.0	189	11.7
	Yes	280	99.6	403	77.2	461	88.5	289	97.0	1433	88.3
	TOTAL	281	100.0	522	100.0	521	100.0	298	100.0	1622	100.0
2000	No	1	0.4	115	20.2	65	12.4	6	1.9	187	11.2
	Yes	261	99.6	454	79.8	461	87.6	304	98.1	1480	88.8
	TOTAL	262	100.0	569	100.0	526	100.0	310	100.0	1667	100.0
2001	No	2	0.8	126	20.6	61	11.6	3	1.1	192	11.4
	Yes	264	99.2	485	79.4	464	88.4	275	98.9	1488	88.6
	TOTAL	266	100.0	611	100.0	525	100.0	278	100.0	1680	100.0
2002	No	2	0.7	90	16.2	50	9.0	4	1.4	146	8.8
	Yes	266	99.3	465	83.8	504	91.0	281	98.6	1516	91.2
	TOTAL	268	100.0	555	100.0	554	100.0	285	100.0	1662	100.0
2003	No	1	0.4	103	17.8	96	15.8	74	19.9	274	15.3
	Yes	229	99.6	475	82.2	512	84.2	297	80.1	1513	84.7
	TOTAL	230	100.0	578	100.0	608	100.0	371	100.0	1787	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

# Babies with major congenital anomalies excluded.

**FIGURE 8****NICUS REGISTRANTS BY MAIN INDICATION FOR ASSISTED VENTILATION, NSW & ACT 2003#**

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.  
# Babies with major congenital anomalies or not ventilated excluded.

**TABLE 91****NICUS REGISTRANTS BY MAIN INDICATION FOR ASSISTED VENTILATION AND GESTATIONAL AGE, NSW & ACT 2003#**

Indication	Gestational age (weeks)								TOTAL	
	22-27		28-31		32-36		37+		No.	%
Hyaline membrane disease	216	94.3	384	80.8	330	64.5	62	20.9	992	65.6
Transient tachypnoea of newborn	4	1.7	58	12.2	126	24.6	62	20.9	250	16.5
Meconium aspiration	0	0.0	1	0.2	2	0.4	47	15.8	50	3.3
Pneumonia	0	0.0	2	0.4	5	1.0	11	3.7	18	1.2
Pulmonary hypertension	0	0.0	1	0.2	6	1.2	19	6.4	26	1.7
Immature lung	8	3.5	13	2.7	3	0.6	0	0.0	24	1.6
Apnoea	0	0.0	10	2.1	17	3.3	17	5.7	44	2.9
Congenital anomaly	1	0.4	1	0.2	0	0.0	0	0.0	2	0.1
Other	0	0.0	3	0.6	13	2.5	29	9.8	45	3.0
Peri surgery	0	0.0	1	0.2	3	0.6	14	4.7	18	1.2
Newborn encephalopathy	0	0.0	1	0.2	7	1.4	36	12.1	44	2.9
TOTAL	229	100.0	475	100.0	512	100.0	297	100.0	1513	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.  
# Babies with major congenital anomalies or not ventilated excluded.

**TABLE 92****NICUS REGISTRANTS BY PROVEN SYSTEMIC INFECTION AND GESTATIONAL AGE, NSW & ACT 2003<sup>#</sup>**

Infection	Gestational age (weeks)									
	22-27		28-31		32-36		37+		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%
No	152	66.1	505	87.4	590	97.0	352	94.9	1599	89.5
Yes	78	33.9	73	12.6	18	3.0	19	5.1	188	10.5
TOTAL	230	100.0	578	100.0	608	100.0	371	100.0	1787	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

# Babies with major congenital anomalies excluded.

**TABLE 93****NICUS REGISTRANTS BY SURFACTANT ADMINISTRATION AND GESTATIONAL AGE, NSW & ACT 1999-2003<sup>#</sup>**

Year	Surfactant administration	Gestational age (weeks)									
		22-27		28-31		32-36		37+		TOTAL	
		No.	%	No.	%	No.	%	No.	%	No.	%
1999	No	57	20.4	216	53.6	280	60.7	216	74.7	769	53.7
	Yes	223	79.6	187	46.4	181	39.3	73	25.3	664	46.3
	TOTAL	280	100.0	403	100.0	461	100.0	289	100.0	1433	100.0
2000	No	59	22.6	254	55.9	282	61.2	255	83.9	850	57.4
	Yes	202	77.4	200	44.1	179	38.8	49	16.1	630	42.6
	TOTAL	261	100.0	454	100.0	461	100.0	304	100.0	1480	100.0
2001	No	56	21.2	275	56.7	325	70.0	220	80.0	876	58.9
	Yes	208	78.8	210	43.3	139	30.0	55	20.0	612	41.1
	TOTAL	264	100.0	485	100.0	464	100.0	275	100.0	1488	100.0
2002	No	66	24.8	277	59.6	366	72.6	238	84.7	947	62.5
	Yes	200	75.2	188	40.4	138	27.4	43	15.3	569	37.5
	TOTAL	266	100.0	465	100.0	504	100.0	281	100.0	1516	100.0
2003	No	42	18.3	256	53.9	350	68.4	238	80.1	886	58.6
	Yes	187	81.7	219	46.1	162	31.6	59	19.9	627	41.4
	TOTAL	229	100.0	475	100.0	512	100.0	297	100.0	1513	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

# Babies with major congenital anomalies or not ventilated excluded.

**TABLE 94****NICUS REGISTRANTS BY TREATED PATENT DUCTUS ARTERIOSUS (PDA) AND GESTATIONAL AGE, NSW & ACT 2003<sup>#</sup>**

PDA-Treatment for PDA	Gestational age (weeks)									
	22-27		28-31		32-36		37+		TOTAL	
	No.	%	No.	%	No.	%	No.	%	No.	%
No treated PDA	120	52.2	491	84.9	602	99.0			1211	85.5
Indomethacin only	94	40.9	83	14.4	5	0.8			182	12.9
Surgery only	3	1.3	1	0.2	1	0.2			5	0.4
Indomethacin & surgery	13	5.7	3	0.5	0	0.0			16	1.1
TOTAL	230	100.0	578	100.0	608	100.0			1416	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

# Babies with major congenital anomalies excluded.

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Overall, the incidence of necrotising enterocolitis (NEC) was 3.7 per cent in 2003 (range 9.8 per cent in 1992 to 2.2 per cent in 2000). The diagnosis of NEC was made radiologically or at surgery in 46.3 per cent of infants and clinically in the remainder. NEC was more common at the lower gestational age groups and 89.6 per cent of the infants with NEC were born at less than 32 weeks gestation (Table 95).

The overall incidence of major surgery was 3.7 per cent in 2003 (range 7.7 per cent in 1992 to 3.1 per cent in 2000). In 2003, 62.1 per cent of the infants who required major surgery were less than 32 weeks gestation (Table 96). The most common surgical procedures amongst these infants were for patent ductus arteriosus and necrotising enterocolitis.

In 2003, the incidence of intraventricular haemorrhage (IVH) among preterm infants (less than 37 weeks gestational age) was 12.9 per cent (range 20.5 per cent in

1993 to 12.9 per cent in 2003). In 2003, confirmed IVH was most common among infants less than 28-weeks gestation (37.8 per cent); 37.9 per cent of these infants had severe IVH (grade 3 or 4). Nine infants less than 32 weeks gestation with severe IVH required surgical drainage for post haemorrhagic hydrocephalus (9/33, 27.3 per cent). Of the surviving infants born before 32 weeks gestation, 94.7 per cent had a head ultrasound examination to detect IVH (Table 97).

The proportion of infants with severe grades (Grades 3, 4 or 5) of retinopathy of prematurity (ROP) was 3.7 per cent in 2003 (range 7.5 per cent in 1992 to 3.7 per cent in 2003). In 2003, one infant with Grade 3 ROP was 30 weeks gestation and 63.3 per cent of the infants less than 28 weeks gestation with severe ROP received either cryo- or laser therapy. Importantly, 23.4 per cent of surviving infants of 28–31 weeks gestational age did not have an eye examination recorded (Table 98).

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**TABLE 95**

**NICUS REGISTRANTS BY NECROTISING ENTEROCOLITIS (NEC) AND GESTATIONAL AGE, NSW & ACT 2003<sup>#</sup>**

NEC—Treatment for NEC	Gestational age (weeks)								TOTAL	
	22–27		28–31		32–36		37+			
	No.	%	No.	%	No.	%	No.	%	No.	%
No NEC	202	87.8	546	94.5	603	99.2	369	99.5	1720	96.3
Clinical diagnosis	14	6.1	16	2.8	5	0.8	1	0.3	36	2.0
X-ray diagnosis	7	3.0	12	2.1	0	0.0	1	0.3	20	1.1
Surgery for NEC	7	3.0	4	0.7	0	0.0	0	0.0	11	0.6
TOTAL	230	100.0	578	100.0	608	100.0	371	100.0	1787	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

# Babies with major congenital anomalies excluded.

**TABLE 96**

**NICUS REGISTRANTS BY MAJOR SURGERY AND GESTATIONAL AGE, NSW & ACT 2003<sup>#</sup>**

Major Surgery	Gestational age (weeks)								TOTAL	
	22–27		28–31		32–36		37+			
	No.	%	No.	%	No.	%	No.	%	No.	%
No	201	87.4	566	97.9	602	99.0	352	94.9	1721	96.3
Yes	29	12.6	12	2.1	6	1.0	19	5.1	66	3.7
TOTAL	230	100.0	578	100.0	608	100.0	371	100.0	1787	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

# Babies with major congenital anomalies excluded.

**TABLE 97****NICUS REGISTRANTS BY INTRAVENTRICULAR HAEMORRHAGE (IVH) AND GESTATIONAL AGE, NSW & ACT 2003#**

Head ultrasound	Gestational age (weeks)							
	22-27		28-31		32-36		TOTAL	
	No.	%	No.	%	No.	%	No.	%
No IVH	127	55.2	457	79.1	254	41.8	838	59.2
Grade 1	43	18.7	58	10.0	14	2.3	115	8.1
Grade 2	11	4.8	6	1.0	2	0.3	19	1.3
Grade 3	8	3.5	7	1.2	3	0.5	18	1.3
Grade 4	25	10.9	4	0.7	2	0.3	31	2.2
Hydrocephalus requiring drainage	5	2.2	4	0.7	1	0.2	10	0.7
Not examined & lived	0	0.0	43	7.4	331	54.4	374	26.4
Not examined & died	16	7.0	3	0.5	2	0.3	21	1.5
TOTAL	230	100.0	578	100.0	608	100.0	1416	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

# Babies with major congenital anomalies excluded.

**TABLE 98****NICUS REGISTRANTS BY RETINOPATHY OF PREMATURITY (ROP) AND GESTATIONAL AGE, NSW & ACT 2003#**

Retinopathy of prematurity (ROP)	Gestational age (weeks)							
	22-27		28-31				TOTAL	
	No.	%	No.	%	No.	%	No.	%
No ROP	71	30.9	391	67.6	462		57.2	
Grade 1	30	13.0	29	5.0	59		7.3	
Grade 2	37	16.1	11	1.9	48		5.9	
Grade 3	29	12.6	1	0.2	30		3.7	
Grade 4	0	0.0	0	0.0	0		0.0	
Grade 5	1	0.4	0	0.0	1		0.1	
Treatment with cryo/laser therapy	19	8.3	0	0.0	19		2.4	
Not examined & lived	1	0.4	135	23.4	136		16.8	
Not examined & died	61	26.5	11	1.9	72		8.9	
TOTAL	230	100.0	578	100.0	808		100.0	

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

# Babies with major congenital anomalies excluded.



(Continued from page 69)

### Service utilisation

Indicators of service utilisation collected as part of NICUS include length of stay in tertiary and non-tertiary centres, days on assisted ventilation, and days in oxygen (Figures 9, 10 and 11 and Table 99). On an individual basis, infants born at less than 28 weeks gestation consumed most resources. However, as a group those born at 28–31 weeks gestation consumed more bed days than any other group due to their higher numbers. In 2003, the total cohort used 57,325 bed days in a tertiary centre in NSW and the ACT (range 46,090 in 1993 to 58,529 in 2000); as well as 19,070 in a non-tertiary centre (level 2 neonatal unit) in NSW and

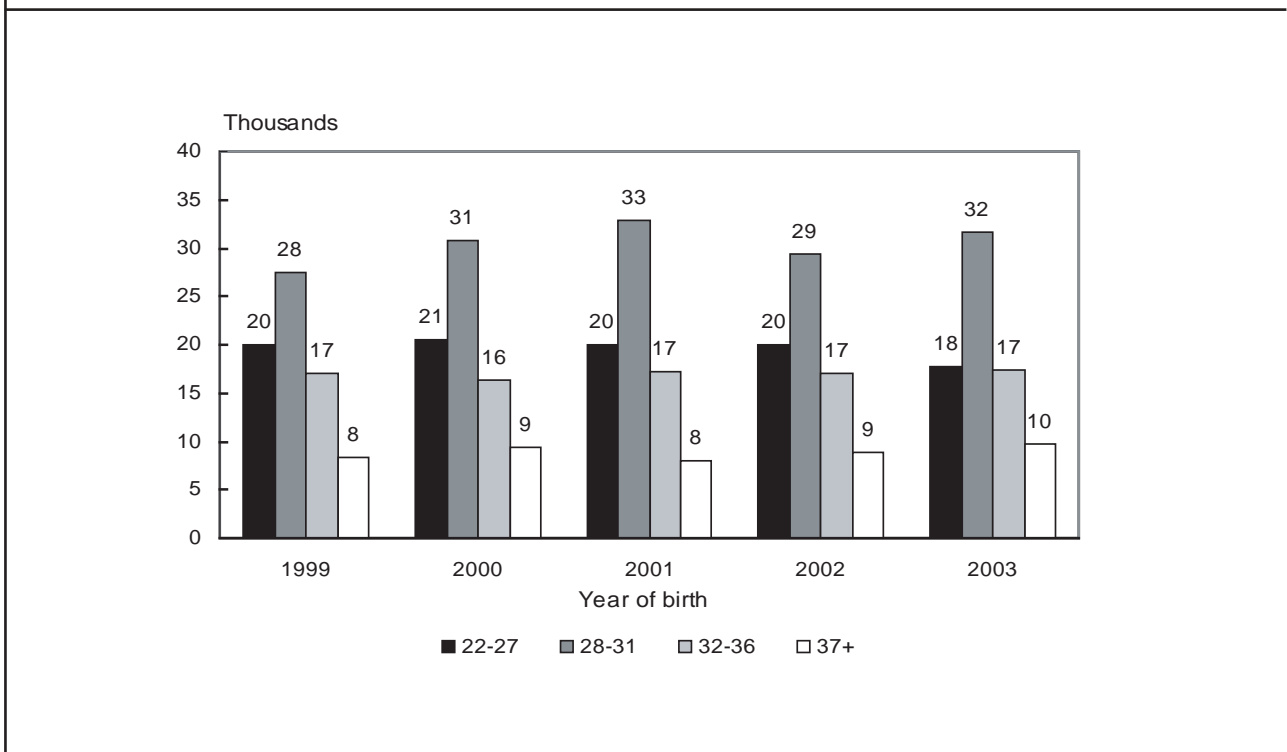
the ACT (14,288 in 1992 to 20,018 in 2001). Even when these infants leave the neonatal intensive care unit, they still require substantial resources.

In 2003, NICUS registrants used 16,266 days of assisted ventilation (range 15,282 in 1993 to 18,909 in 2000) and 26,351 days of oxygen therapy (range 22,526 in 1992 to 30,802 in 2001). In 2003, 62 (3.5 per cent) infants were discharged home on oxygen therapy (range 2.1 per cent in 1992 to 5.1 per cent in 1998). The proportion of infants less than 28 weeks gestation discharged home on oxygen therapy was 14.8 per cent (range 7.5 per cent in 1992 to 21.3 per cent in 2002) (Table 100).

*Continued on page 75*

**FIGURE 9**

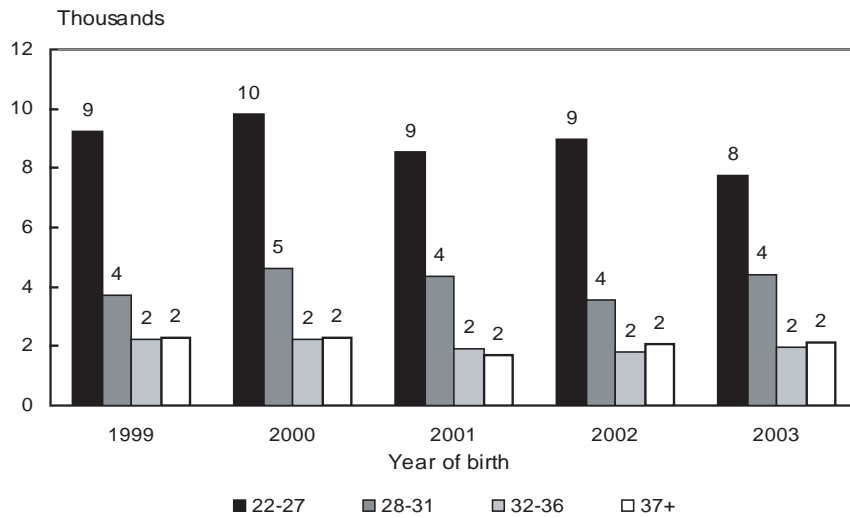
**NICUS REGISTRANTS BY TOTAL NUMBER OF DAYS IN HOSPITAL AND GESTATIONAL AGE, NSW & ACT 2003**



Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

**FIGURE 10**

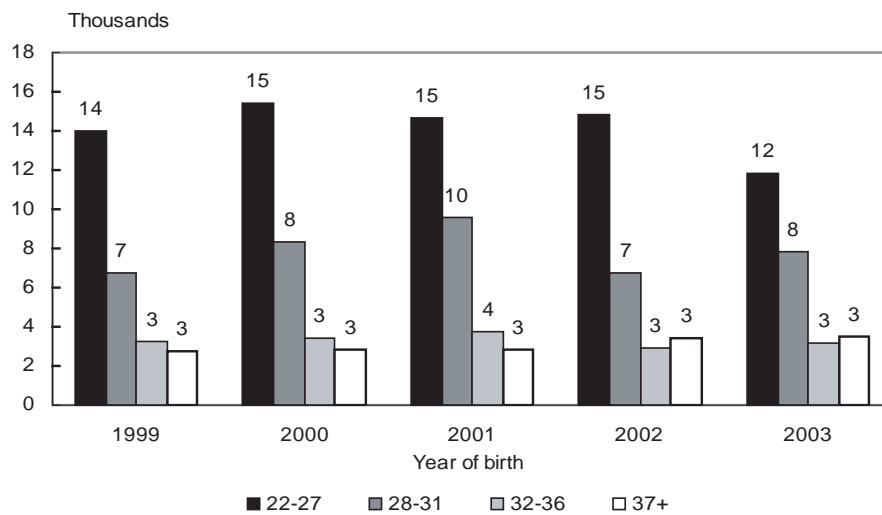
**NICUS REGISTRANTS BY TOTAL NUMBER OF DAYS OF ASSISTED VENTILATION AND GESTATIONAL AGE, NSW & ACT 2003**



Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

**FIGURE 11**

**NICUS REGISTRANTS BY TOTAL NUMBER OF DAYS OF OXYGEN THERAPY AND GESTATIONAL AGE, NSW & ACT 1999-2003**



Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

**TABLE 99**
**NICUS REGISTRANTS BY SERVICE UTILISATION INDICATORS AND GESTATIONAL AGE, NSW & ACT 2003**

Indicators	Gestational age (weeks)				TOTAL
	22-27	28-31	32-36	37+	
<b>Non-tertiary hospital stay (days)</b>					
Minimum	0	0	0	0	0
Maximum	77	267	129	78	267
Sum	1727	10350	5626	1367	19070
Median	0	16	4	0	1
25th percentile	0	0	0	0	0
75th percentile	8	30	15	3	15
<b>Tertiary hospital stay (days)</b>					
Minimum	1	0	0	0	0
Maximum	170	238	101	310	310
Sum	16055	21237	11726	8307	57325
Median	69	32	14	10	17
25th percentile	25	16	7	5	8
75th percentile	97	49	23	17	36
<b>Total hospital stay (days)</b>					
Minimum	1	1	0	1	0
Maximum	179	505	165	310	505
Sum	17782	31587	17351	9674	76394
Median	80	48	23	12	28
25th percentile	27	37	16	7	14
75th percentile	101	62	33	20	49
<b>Mechanical ventilation (days)</b>					
Minimum	0	0	0	0	0
Maximum	92	171	38	78	171
Sum	2729	1363	803	1549	6443
Median	5	0	0	1	0
25th percentile	1	0	0	0	0
75th percentile	14	2	1	3	2
<b>Continuous Positive Airways Pressure (days)</b>					
Minimum	0	0	0	0	0
Maximum	71	69	120	162	162
Sum	5028	3068	1168	558	9823
Median	18	2	0	0	0
25th percentile	0	0	0	0	0
75th percentile	35	6	2	0	3
<b>Assisted ventilation (days)</b>					
Minimum	0	0	0	0	0
Maximum	120	174	131	241	241
Sum	7757	4431	1971	2107	16266
Median	27	3	1	1	2
25th percentile	9	1	0	0	0
75th percentile	50	8	3	4	6
<b>Oxygen (days)</b>					
Minimum	1	0	0	0	0
Maximum	179	505	118	278	505
Sum	11862	7819	3203	3467	26351
Median	30	3	2	2	3
25th percentile	7	1	1	1	1
75th percentile	87	10	6	6	8

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

**TABLE 100****NICUS REGISTRANTS BY HOME OXYGEN ADMINISTRATION AND GESTATIONAL AGE, NSW & ACT 1999–2003#**

Year	Home oxygen	Gestational age (weeks)								TOTAL	
		22–27		28–31		32–36		37+			
		No.	%	No.	%	No.	%	No.	%	No.	%
1999	No	243	86.5	509	97.5	519	99.6	295	99.0	1566	96.5
	Yes	38	13.5	13	2.5	2	0.4	3	1.0	56	3.5
	TOTAL	281	100.0	522	100.0	521	100.0	298	100.0	1622	100.0
2000	No	211	80.5	554	97.4	519	98.7	306	98.7	1590	95.4
	Yes	51	19.5	15	2.6	7	1.3	4	1.3	77	4.6
	TOTAL	262	100.0	569	100.0	526	100.0	310	100.0	1667	100.0
2001	No	216	81.2	582	95.3	524	99.8	275	98.9	1597	95.1
	Yes	50	18.8	29	4.7	1	0.2	3	1.1	83	4.9
	TOTAL	266	100.0	611	100.0	525	100.0	278	100.0	1680	100.0
2002	No	210	78.4	542	97.7	551	99.5	280	98.2	1583	95.2
	Yes	58	21.6	13	2.3	3	0.5	5	1.8	79	4.8
	TOTAL	268	100.0	555	100.0	554	100.0	285	100.0	1662	100.0
2003	No	196	85.2	554	95.8	606	99.7	369	99.5	1725	96.5
	Yes	34	14.8	24	4.2	2	0.3	2	0.5	62	3.5
	TOTAL	230	100.0	578	100.0	608	100.0	371	100.0	1787	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

# Babies with major congenital anomalies excluded.

(Continued from page 71)

## Survival

Infants with a major congenital anomaly have been excluded from the analysis of survival, with the exception of data reported in Table 104.

The six-month survival rate for all infants without a major congenital anomaly in the 2003 cohort was 94.3 per cent (range 87.8 per cent in 1992 to 94.3 per cent in 2003). Survival of infants born at less than 25 weeks gestation was 33.3 per cent (range 33.3 per cent in 2003 to 54.8 per cent in 1993). There was a trend for survival to improve with gestational age (Figure 12 and Table 102). Term infants (94.9 per cent) were slightly more likely to survive than preterm infants (94.2 per cent). Among infants who died, 65.3 per cent of deaths occurred during the first week of life (range 62.5 per cent in 1998 to 76.2 per cent in 2002) with a further 27.7 per cent occurring during the first month of life (Table 101).

The six-month survival rate improved with increasing birthweight, ranging from 55.0 per cent for infants in the 500–599 gram group to 89.3 per cent for the 900–999 gram group. Six-month survival continued to improve with increasing birthweight to a maximum of 99.4 per cent for infants of 1,750–1,999 grams birthweight and then decreased slightly (Table 102).

The majority of infants registered in NICUS were born at a tertiary centre. Although the gestational age is the most

important risk factor for mortality, disease severity is also important. At each gestational age group those with severe disease are more likely to be transferred to a neonatal intensive care unit.

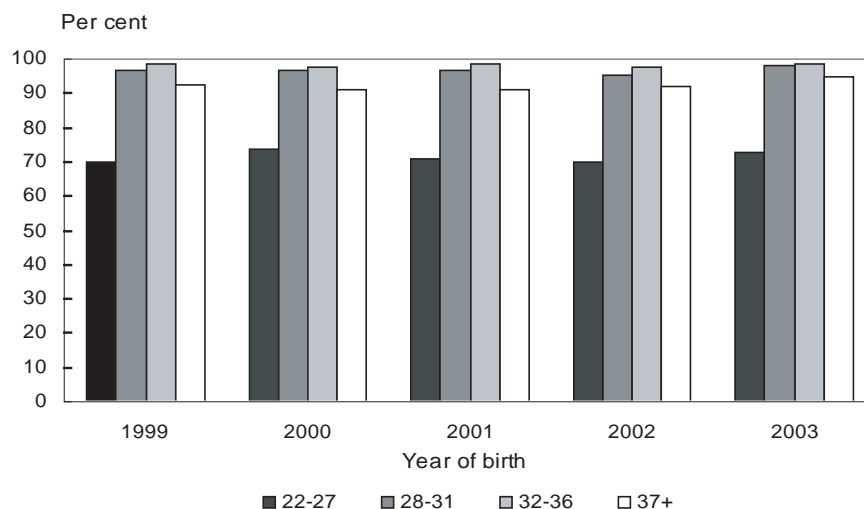
In 2003, the six-month survival rate for infants born at 22 to 27 weeks was greater for those born in a tertiary centre (73.4 per cent) compared with those born in a non-tertiary centre (69.2 per cent). Term infants born in a tertiary centre (97.6 per cent) were more likely to survive than term infants born in a non-tertiary centre (93.8 per cent). Place of birth did not substantially affect survival for infants in the other gestational age groups (Table 103).

The six-month survival rate was similar for males (94.5 per cent) and females (94.2 per cent) overall, and for all gestational age groups: less than 28 weeks (71.1 per cent versus 74.1 per cent); 28–31 weeks (98.4 per cent versus 97.7 per cent); 32–36 weeks (98.3 per cent versus 99.2 per cent); and 37–41 weeks gestation groups (95.4 per cent versus 95.1 per cent).

The six-month survival rate was 94.4 per cent ( $n=1,311$ ) for singleton infants and 94.2 per cent ( $n=375$ ) for multiple gestation infants. Plurality did not influence survival in infants 28–36 weeks gestational age. In 2003 the survival rate for infants in the less than 28 week gestation group was lower for infants born of a multiple (42/62; 67.7 per cent) than a singleton pregnancy (125/168; 74.4 per cent).

FIGURE 12

NICUS REGISTRANTS BY 6-MONTHS SURVIVAL AND GESTATIONAL AGE, NSW & ACT 1999–2003#



Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.  
# Babies with major congenital anomalies excluded.

As expected the overall survival rate was generally lower (83.9 per cent) in the presence of a major congenital anomaly (Table 104).

Post-mortem examinations were performed on 18/101 infants (17.8 per cent) who died in the 2003 cohort (Figure 13 and Table 105). Post-mortem examinations were most

commonly not requested for infants 22–27 weeks gestation (46.0 per cent) and term infants (52.6 per cent). The highest rate of refusal was in the 22–27 (41.3 per cent) and 32–36 week group (37.5 per cent) and the highest rate of post-mortems done was in the 37–42 week group (36.8 per cent).

**TABLE 101**

**NICUS REGISTRANTS BY DURATION OF SURVIVAL AND GESTATIONAL AGE, NSW & ACT 2003#**

Gestational age (weeks)	Alive at six months		Age at death (days)						TOTAL	
	No.	%	0–7		8–28		28+		No.	%
23	3	25.0	9	75.0	0	0.0	0	0.0	12	0.7
24	10	37.0	11	40.7	5	18.5	1	3.7	27	1.5
25	39	70.9	11	20.0	4	7.3	1	1.8	55	3.1
26	57	78.1	10	13.7	6	8.2	0	0.0	73	4.1
27	58	92.1	2	3.2	3	4.8	0	0.0	63	3.5
28	99	97.1	3	2.9	0	0.0	0	0.0	102	5.7
29	98	95.1	2	1.9	3	2.9	0	0.0	103	5.8
30	172	99.4	0	0.0	1	0.6	0	0.0	173	9.7
31	198	99.0	1	0.5	1	0.5	0	0.0	200	11.2
32	163	98.8	1	0.6	0	0.0	1	0.6	165	9.2
33	139	97.9	1	0.7	0	0.0	2	1.4	142	7.9
34	133	99.3	0	0.0	0	0.0	1	0.7	134	7.5
35	92	97.9	1	1.1	1	1.1	0	0.0	94	5.3
36	73	100.0	0	0.0	0	0.0	0	0.0	73	4.1
37	71	95.9	2	2.7	1	1.4	0	0.0	74	4.1
38	87	93.5	4	4.3	1	1.1	1	1.1	93	5.2
39	72	97.3	2	2.7	0	0.0	0	0.0	74	4.1
40	66	97.1	2	2.9	0	0.0	0	0.0	68	3.8
41	46	92.0	2	4.0	2	4.0	0	0.0	50	2.8
42	10	83.3	2	16.7	0	0.0	0	0.0	12	0.7
TOTAL	1686	94.3	66	3.7	28	1.6	7	0.4	1787	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.  
# Babies with major congenital anomalies excluded.

**TABLE 102**

**NICUS REGISTRANTS BY DURATION OF SURVIVAL AND BIRTHWEIGHT, NSW & ACT 2003#**

Birthweight (grams)	Alive at six months		Age at death (days)						TOTAL	
	No.	%	0–7		8–28		28+		No.	%
Less than 400	0	0.0	0	0.0	1	100.0	0	0.0	1	0.1
400–499	3	37.5	4	50.0	1	12.5	0	0.0	8	0.4
500–599	11	55.0	5	25.0	3	15.0	1	5.0	20	1.1
600–699	22	64.7	7	20.6	5	14.7	0	0.0	34	1.9
700–799	35	72.9	11	22.9	2	4.2	0	0.0	48	2.7
800–899	46	79.3	8	13.8	3	5.2	1	1.7	58	3.2
900–999	67	89.3	6	8.0	2	2.7	0	0.0	75	4.2
1,000–1,249	177	95.7	4	2.2	4	2.2	0	0.0	185	10.4
1,250–1,499	240	98.4	2	0.8	1	0.4	1	0.4	244	13.7
1,500–1,749	203	99.0	2	1.0	0	0.0	0	0.0	205	11.5
1,750–1,999	171	99.4	1	0.6	0	0.0	0	0.0	172	9.6
2,000–2,499	212	98.6	0	0.0	1	0.5	2	0.9	215	12.0
2,500–2,999	182	95.8	4	2.1	3	1.6	1	0.5	190	10.6
3,000–3,499	147	95.5	6	3.9	1	0.6	0	0.0	154	8.6
3,500–3,999	104	94.5	5	4.5	1	0.9	0	0.0	110	6.2
4,000+	66	97.1	1	1.5	0	0.0	1	1.5	68	3.8
TOTAL	1686	94.3	66	3.7	28	1.6	7	0.4	1787	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.  
# Babies with major congenital anomalies excluded.

**TABLE 103****NICUS REGISTRANTS BY DURATION OF SURVIVAL, PLACE OF BIRTH AND GESTATIONAL AGE, NSW & ACT 2003<sup>#</sup>**

Gestational age (weeks)	Place of birth	Alive at six months		0-7		Age at death (days) 8-28		28+		TOTAL	
		No.	%	No.	%	No.	%	No.	%	No.	%
22-27	Non tertiary	18	69.2	5	19.2	3	11.5	0	0.0	26	11.4
	Tertiary	149	73.4	37	18.2	15	7.4	2	1.0	203	88.6
	Sub-total	167	72.9	42	18.3	18	7.9	2	0.9	229	100.0
28-31	Non tertiary	60	96.8	1	1.6	1	1.6	0	0.0	62	10.7
	Tertiary	506	98.3	5	1.0	4	0.8	0	0.0	515	89.3
	Sub-total	566	98.1	6	1.0	5	0.9	0	0.0	577	100.0
32-36	Non tertiary	166	98.8	1	0.6	1	0.6	0	0.0	168	27.8
	Tertiary	431	98.6	2	0.5	0	0.0	4	0.9	437	72.2
	Sub-total	597	98.7	3	0.5	1	0.2	4	0.7	605	100.0
37-41	Non tertiary	180	93.8	9	4.7	2	1.0	1	0.5	192	53.6
	Tertiary	162	97.6	2	1.2	2	1.2	0	0.0	166	46.4
	Sub-total	342	95.5	11	3.1	4	1.1	1	0.3	358	100.0
42+	Non tertiary	3	60.0	2	40.0	0	0.0	0	0.0	5	45.5
	Tertiary	6	100.0	0	0.0	0	0.0	0	0.0	6	54.5
	Sub-total	9	81.8	2	18.2	0	0.0	0	0.0	11	100.0
TOTAL		1681	94.4	64	3.6	28	1.6	7	0.4	1780	100.0

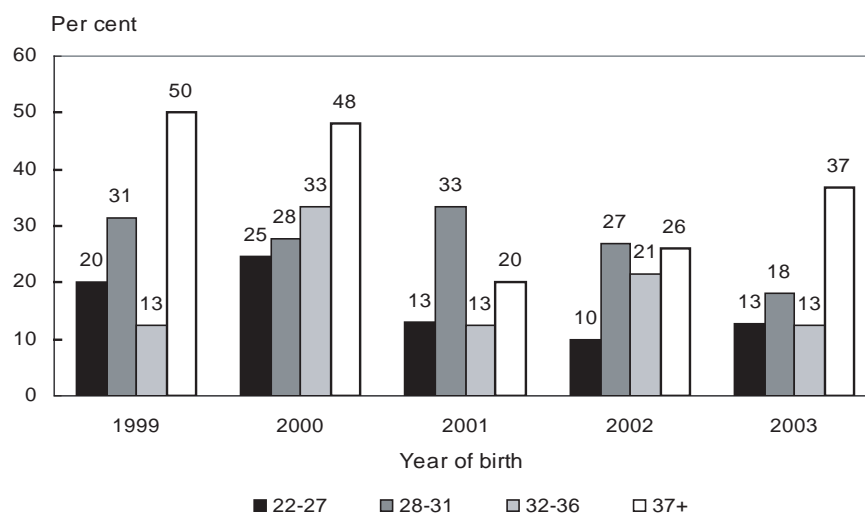
Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

# Babies with major congenital anomalies excluded. Babies born before arrival excluded.

**TABLE 104****NICUS REGISTRANTS BY DURATION OF SURVIVAL, MAJOR CONGENITAL ANOMALY AND GESTATIONAL AGE, NSW & ACT 2003**

Gestational age (weeks)	Major congenital anomaly	Alive at six months		0-7		Age at death (days) 8-28		28+		TOTAL	
		No.	%	No.	%	No.	%	No.	%	No.	%
22-27	No	167	72.6	43	18.7	18	7.8	2	0.9	230	92.7
	Yes	11	61.1	2	11.1	1	5.6	4	22.2	18	7.3
	Sub-total	178	71.8	45	18.1	19	7.7	6	2.4	248	100.0
28-31	No	567	98.1	6	1.0	5	0.9	0	0.0	578	95.4
	Yes	20	71.4	5	17.9	1	3.6	2	7.1	28	4.6
	Sub-total	587	96.9	11	1.8	6	1.0	2	0.3	606	100.0
32-36	No	600	98.7	3	0.5	1	0.2	4	0.7	608	90.3
	Yes	54	83.1	8	12.3	1	1.5	2	3.1	65	9.7
	Sub-total	654	97.2	11	1.6	2	0.3	6	0.9	673	100.0
37-41	No	342	95.3	12	3.3	4	1.1	1	0.3	359	64.5
	Yes	174	87.9	6	3.0	12	6.1	6	3.0	198	35.5
	Sub-total	516	92.6	18	3.2	16	2.9	7	1.3	557	100.0
42+	No	10	83.3	2	16.7	0	0.0	0	0.0	12	85.7
	Yes	2	100.0	0	0.0	0	0.0	0	0.0	2	14.3
	Sub-total	12	85.7	2	14.3	0	0.0	0	0.0	14	100.0
TOTAL		1947	92.8	87	4.1	43	2.0	21	1.0	2098	100.0

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.

**FIGURE 13****NICUS REGISTRANT DEATHS BY POST-MORTEM EXAMINATION AND GESTATIONAL AGE, NSW & ACT 1999–2003#**

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.  
# Babies with major congenital anomalies excluded.

**TABLE 105****NICUS REGISTRANTS BY POST-MORTEM EXAMINATION AND GESTATIONAL AGE, NSW & ACT 2003#**

Post-mortem	Gestational age (weeks)								TOTAL	
	22–27		28–31		32–36		37+		No.	%
	No.	%	No.	%	No.	%	No.	%	No.	%
Not requested	29	46.0	6	54.5	4	50.0	10	52.6	49	48.5
Refused	26	41.3	3	27.3	3	37.5	2	10.5	34	33.7
Done	8	12.7	2	18.2	1	12.5	7	36.8	18	17.8
<b>TOTAL</b>	<b>63</b>	<b>100.0</b>	<b>11</b>	<b>100.0</b>	<b>8</b>	<b>100.0</b>	<b>19</b>	<b>100.0</b>	<b>101</b>	<b>100.0</b>

Source: NICUS Data Collection. NSW Centre for Perinatal Health Services Research.  
# Babies with major congenital anomalies excluded.