The risks of childbearing at older ages

Ying C. MacNab, Julie Macdonald and Terry A. Tuk

Abstract

Objectives

This article investigates whether, compared with younger women, those aged 30-34 and 35 and older experienced a higher risk of adverse pregnancy outcomes and maternal complications, and whether their infants faced an increased risk of perinatal complications and congenital anomalies.

Data source

The analysis is based on data from the British Columbia birth registry for all 342,219 liveborn and stillborn births to women aged 20 and older between 1987 and 1994.

Analytical techniques

Crude odds ratios comparing mothers' age groups were calculated for selected maternal and infant complications and congenital anomalies, by parity. Multiple logistic regression was used to obtain odds ratios for pregnancy outcomes.

Main results

For both parity groups, the odds of having a cesarean delivery increased with maternal age. An elevated risk of having a low birth weight infant or preterm birth was also found for older primiparous women. There was a higher risk of chromosonal anomalies for infants of older mothers. The risk of some maternal complications increased with age, yet for most perinatal complications there was no clear age effect.

Key words

cesarean section, low birth weight, preterm birth, stillbirth, maternal complications, perinatal complications, congenital anomalies

Authors

Ying C. MacNab (250-952-2518), Julie Macdonald (250-952-2558) and Terry A. Tuk (250-952-2599) are with the British Columbia Vital Statistics Agency, Victoria V8W 1H8.

During the last 20 years, there has been a growing tendency for mothers to have their first child later in life. As a result, the proportion of Canadian women giving birth for the first time at age 35 or older has risen, a pattern that has also occurred in other industrialized nations.[1-5]

Pregnancy at older ages has been associated with an increased risk of various maternal complications, cesarean section, preterm birth, and low birth weight.[2,3,6] Other studies, however, have not found significant associations.[7,8]

Using data from the British Columbia birth registry for 1987 to 1994, this article investigates whether, compared with younger pregnant women, those aged 30-34 and 35 and older experienced a higher risk of adverse pregnancy outcomes and maternal complications, and whether their infants faced an increased risk of perinatal complications and of congenital anomalies.

More births to older mothers

In 1994, the majority (51%) of live births in British Columbia were to mothers in their twenties. Nonetheless, 13% of all live births that year were to mothers aged 35 and older, up from 9% in 1987 (Chart 1). And of the 6,289 infants born to older mothers in 1994, 1,774 were first births, more than double the number in 1987 (Table 1).

In part, the number of infants born to women aged 35 and older rose because the number of women in this age group increased. However, when expressed as a rate, the trend toward later maternal age persists. Between 1987 and 1994, the live birth rate rose from 4.9 to 6.7 per 1,000 British Columbian women aged 35 and older.

Adverse pregnancy outcomes

To calculate the risk of an adverse pregnancy outcome, odds ratios comparing age groups were calculated separately by parity, that is, by whether the mother had given birth before (see *Methods*). Parity distinguishes primiparous women (first-time mothers) from multiparous women (mothers of second or subsequent infants).

With the exception of stillbirth, the risk of an adverse pregnancy outcome increased with age for

Methods

Data source

This analysis uses birth data from 1987 to 1994 obtained from the British Columbia Birth Registry at the British Columbia Vital Statistics Agency, Ministry of Health and Ministry Responsible for Seniors. The primary source of these data—the Physician's Notice of Birth—is submitted to the Agency within 48 hours after a live birth or stillbirth. A total of 342,219 live births and stillbirths were considered: 140,824 to primiparous women and 201,395 to multiparous women.

Analytical techniques

Rates and crude odds ratios together with 95% Cornfield confidence intervals[9] were calculated to compare maternal age groups for categories of maternal and infant complications and congenital anomalies by maternal age and parity (Appendix, Tables A to D). The maternal and infant complications were selected on the basis of their potential impact on the health of mothers and/or their infants.

The impact of age on adverse pregnancy outcomes was assessed using multiple logistic regression. The fitted model for each adverse pregnancy outcome included as predictor variables categories of maternal and infant complications and congenital anomalies. Residual diagnostic plots and goodness-of-fit tests showed no evidence of problems with fit.

Throughout this article, women aged 20-29 form the reference group; that is, odds were calculated for primiparous women and multiparous women aged 30-34 and 35 and older relative to women of the same parity aged 20-29.

Limitations

The findings were derived from counts of liveborn or stillborn infants, where each infant was classified as one birth. Because counts of infants and not mothers were used, a woman was counted more than once if she had a multiple birth. For example, in counting cesarean sections, a mother who had twins was counted twice. The numbers of women with low birth weight, preterm or stillborn babies were similarly overestimated. Odds ratios and confidence intervals were affected by this multiple counting as well as by the lack of independence of the results for multiple infants of one mother. Since multiple births tend to occur more often as maternal age increases,[10] the negative implications of advanced maternal age may be somewhat overstated.

To investigate whether any overestimates were significant enough to affect the conclusions, the data were disaggregated into multiple and single births. From 1987 to 1994 there were 7,370 multiple births: 2,936 to primiparous women and 4,434 to multiparous women. Counts, crude odds ratios and their confidence intervals were recalculated using estimated counts of mothers. The results showed only small differences that did not affect the conclusions. Crude odds ratios and odds ratios from multiple regression were also recalculated using single births only. (For single births, counting babies is equivalent to counting mothers.) Again, this yielded only small differences that did not affect the conclusions presented here.

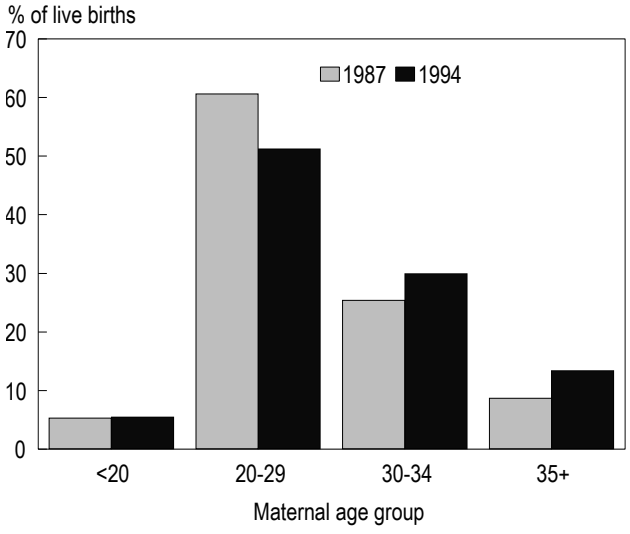
Pregnancy and birth are influenced by social and economic factors, maternal health and lifestyle, as well as by biological factors. However, this study does not adjust for factors such as the effects of smoking, maternal nutrition, maternal body mass, gestational weight gain during pregnancy or socioeconomic status.

Table 1
Live births to women aged 35 and older, British Columbia, 1987 to 1994

	Total live births to women aged 35+			First live births to women aged 35+			Female population in B.C. aged 35+
		%†	Annual rate‡		%§	Annual rate‡	
1987 - 1994	**39,396**	**11.0**	**5.9**	**10,227**	**2.9**	**1.5**	**6,672,684**
1987	3,638	8.7	4.9	883	2.1	1.2	735,751
1988	4,119	9.6	5.4	989	2.3	1.3	760,103
1989	4,309	9.9	5.5	1,087	2.5	1.4	787,553
1990	4,832	10.7	5.9	1,213	2.7	1.5	817,000
1991	4,983	11.0	5.9	1,279	2.8	1.5	845,255
1992	5,347	11.7	6.1	1,381	3.0	1.6	875,639
1993	5,879	12.8	6.5	1,621	3.5	1.8	908,343
1994	6,289	13.4	6.7	1,774	3.8	1.9	943,040

Source: *MacNab YC (reference 11)*
† Live births to women aged 35 and older as a percentage of live births to women of all ages
‡ Births per 1,000 women aged 35 and older in British Columbia
§ First live births to women aged 35 and older as a percentage of first live births to women of all ages

Chart 1
Percentage distribution of maternal age groups for live births, British Columbia, 1987 and 1994



Source: *MacNab YC (reference 11)*
Note: *Derived from counts of liveborn infants.*

Table 2
Odds ratios for adverse pregnancy outcomes, by parity and maternal age, British Columbia, 1987 to 1994

	Maternal age			
	30 - 34		35 and older	
Pregnancy outcomes	**Odds ratio**	**95% confidence interval**	**Odds ratio**	**95% confidence interval**
Cesarean section				
Primiparous	1.32*	1.27, 1.36	1.83*	1.74, 1.93
Multiparous	1.17*	1.13, 1.20	1.39*	1.34, 1.44
Low birth weight†				
Primiparous	1.08*	1.02, 1.14	1.29*	1.19, 1.40
Multiparous	.93*	.89, .98	1.06	.99, 1.13
Preterm‡				
Primiparous	1.16*	1.11, 1.22	1.35*	1.26, 1.46
Multiparous	.89*	.85, .93	1.11*	1.05, 1.18
Stillbirth				
Primiparous	.96	.83, 1.12	1.03	.84, 1.27
Multiparous	.93	.81, 1.07	1.19*	1.01, 1.40

Data source: *British Columbia Birth Registry, B.C. Vital Statistics Agency*
Note: *The odds ratios were derived from counts of live born or stillborn infants. Separate multiple logistic regressions for each parity group and each pregnancy outcome were computed. Other independent variables in the regression, not shown in the table, include selected maternal and perinatal complications and congenital anomalies. Maternal age group 20-29 was used as the reference group.*
† Less than 2,500 g
‡ Gestation less than 37 weeks
** $p \leq 0.05$*

first-time mothers (Table 2). For example, primiparous women aged 30-34 faced significantly higher odds of cesarean section (odds ratio 1.32) and of preterm birth (odds ratio 1.16) than primiparous women aged 20-29. They also had a slightly elevated risk of delivering a low birth weight infant (odds ratio 1.08). Their counterparts aged 35 and older had even higher risks of cesarean delivery (odds ratio 1.83), preterm birth (odds ratio 1.35), and low birth weight infant (odds ratio 1.29).

For women who had given birth before, only the risk of cesarean section clearly rose with age. Multiparous women aged 30-34 had significantly higher odds of cesarean section (odds ratio 1.17) than did those aged 20-29. Multiparous women aged 35 and older faced an even higher risk (odds ratio 1.39).

For stillbirth, the pattern was not as evident. The odds of stillbirth among multiparous women aged 30-34 were not significantly different from those for their counterparts aged 20-29. But the odds were slightly elevated for multiparous women aged 35 and older (odds ratio 1.19). Another study based on neonatal data aggregated from 1961 to 1993 noted a relationship between advanced maternal age and fetal death.[12] For low birth weight and preterm birth, an age effect was not found among multiparous women.

Maternal complications

Overall, delayed childbearing entailed a heightened risk of maternal complications (Table 3). First-time mothers aged 30-34 faced increased odds for eight maternal complications compared with those aged 20-29: antepartum hemorrhage; diabetes mellitus and gestational diabetes; multiple gestation; malposition and malpresentation of fetus, disproportion and obstructed labour; abnormality of reproductive organs; fetal abnormality affecting mother; abnormality of forces of labour and prolonged labour; and obstetrical trauma (see *Definitions*). Among those aged 35 and older, the odds for seven of these eight complications were higher still, with the exception of obstetrical trauma. In addition, their odds of hypertension/eclampsia were also significantly high.

A similar age effect was evident for women who had given birth before, though their odds were for the most part relatively lower. Multiparous women aged 30-34 faced an increased risk for six of the eleven selected maternal complications: antepartum hemorrhage; hypertension/eclampsia; diabetes mellitus and gestational diabetes; malposition and malpresentation of the fetus, disproportion and obstructed labour; abnormality of the reproductive organs; and abnormality of forces of labour and prolonged labour. For these six complications, the odds were higher for multiparous women aged 35 and older. Elevated odds for a seventh maternal complication (fetal abnormality affecting mother) were also found in the older age group.

Conversely, the odds for postpartum hemorrhage were lower among older mothers. For multiparous

Definitions

Abnormality of the reproductive organs (654.0-654.9): The most common condition in this category is uterine scar, resulting from a previous cesarean section. Also included are maternal congenital abnormalities, such as bicornis uterus and functional abnormalities, such as incompetent cervix.

Fetal abnormality affecting mother (655.0-656.9): These conditions describe circumstances where there is a prenatally known or suspected fetal malformation, disease, damage or other problem that affects the maternal management of the pregnancy. The most frequent condition noted in this group is monitored fetal distress (656.3). Also included are blood group abnormalities leading to antibody problems and fetal hydrocephalus. These conditions are generally identified and coded as prenatal conditions. Maternal codes are applied only if the physician has indicated that pre-knowledge exists and has affected the management of the mother. For example, not every case involving fetal distress is included in this category.

Abnormality of forces of labour and prolonged labour (661.0-662.3): This category refers to prolonged or precipitate labour that is not otherwise qualified or is noted as due to specific abnormal uterine activity such as inertia or hypertonia. The most frequent conditions in this group describe prolonged labour (usually second stage) and secondary uterine inertia (usually described as failure to progress not resulting in cesarean section).

women, the odds of this complication decreased with age.

The higher odds for maternal complications, particularly gestational diabetes, eclampsia and abnormal forces of labour, may reflect functional metabolic, endocrine and hormonal (especially ovarian) changes in older women.

In addition to an age effect, the higher crude odds ratios among older mothers reflect interrelationships among maternal complications. For example, mothers with diabetes tend to have heavier infants. This may contribute to fetopelvic disproportion and lead to obstructed or prolonged labour.

An age effect was not observed for every maternal complication considered. For example,

Table 3
Crude odds ratios for births with maternal complications, by parity and maternal age, British Columbia, 1987 to 1994

	Maternal age			
	30 - 34		35 and older	
Maternal complication (ICD-9 codes)	Odds ratio	95% confidence interval	Odds ratio	95% confidence interval
Antepartum hemorrhage (640.0- 641.9)				
Primiparous	1.38*	1.23, 1.54	2.16*	1.86, 2.51
Multiparous	1.12*	1.02, 1.22	1.39*	1.24, 1.54
Hypertension/eclampsia (642.0 - 642.9)				
Primiparous	1.07	1.00, 1.15	1.39*	1.25, 1.53
Multiparous	1.24*	1.13, 1.36	1.87*	1.69, 2.08
Diabetes mellitus and gestational diabetes (648.0, 648.8)				
Primiparous	1.80*	1.65, 1.95	2.66*	2.39, 2.97
Multiparous	1.80*	1.67, 1.94	2.89*	2.66, 3.13
Multiple gestation (651.0 - 651.9)				
Primiparous	1.46*	1.34, 1.58	1.73*	1.53, 1.95
Multiparous	1.03	.96, 1.10	.91	.83, 1.00
Malposition and malpresentation of fetus, disproportion and obstructed labour (652.0 - 653.9, 660.0 - 660.9)				
Primiparous	1.32*	1.27, 1.37	1.46*	1.39, 1.54
Multiparous	1.18*	1.13, 1.23	1.32*	1.25, 1.40
Abnormality of reproductive organs (654.0 - 654.9)				
Primiparous	2.38*	2.07, 2.74	4.12*	3.48, 4.88
Multiparous	1.14*	1.09, 1.18	1.26*	1.20, 1.32
Fetal abnormality affecting mother (655.0 - 656.9)				
Primiparous	1.24*	1.18, 1.30	1.54*	1.43, 1.65
Multiparous	1.05	1.00, 1.11	1.28*	1.20, 1.37
Abnormality of forces of labour and prolonged labour (661.0 - 662.3)				
Primiparous	1.29*	1.22, 1.35	1.44*	1.33, 1.56
Multiparous	1.16*	1.07, 1.26	1.32*	1.20, 1.46
Complications of umbilical cord (663.0 - 663.9)				
Primiparous	.95	.84, 1.07	.94	.77, 1.14
Multiparous	1.04	.95, 1.15	1.10	.97, 1.25
Obstetrical trauma (664.0 - 665.9)				
Primiparous	1.19*	1.03, 1.37	.91	.71, 1.17
Multiparous	1.10	.96, 1.27	1.09	.90, 1.32
Postpartum hemorrhage (666.0 - 666.3)				
Primiparous	.96	.85, 1.09	.87	.70, 1.08
Multiparous	.76*	.68, .84	.67*	.57, .78

Data source: *British Columbia Birth Registry, B.C. Statistics Agency*
Note: *The odds ratios were derived from counts of live born or stillborn infants. Maternal age group 20-29 was used as the reference group.*
** $p \leq 0.05$*

complications of the umbilical cord showed no significant pattern. And although primiparous women aged 30-34 had slightly higher odds (1.19) of obstetrical trauma than those aged 20-29, there was no age effect overall.

Perinatal complications

Although a clear age effect was not evident for the selected perinatal complications, the odds were elevated in the oldest age group for two of them: fetal growth retardation, small for gestation age (SGA), fetal malnutrition (primiparous only), and intrauterine hypoxia and birth asphyxia (both parity groups) (Table 4). Like maternal complications, perinatal complications are interrelated. For example, delayed fetal growth is generally due to a process of intrauterine deprivation and is consequently associated with birth asphyxia.

There are two types of fetal growth retardation, both resulting in small organs of subnormal weight. From the data used in this analysis, the type could not be identified. However, Type II SGA infants (who develop from embryonic cells that are normal in number but smaller in size) are identified with maternal preeclampsia (that is, pregnancy-induced hypertension). And pregnant women aged 35 and older have a high risk of preeclampsia, suggesting a preponderance of Type II SGA.

Because preeclampsia is reversible with optimum maternal nutrition,[14] ensuring a good diet among pregnant women, as well as the early detection and control of preeclampsia, could reduce the number of SGA infants. However, any benefits from optimizing nutrition can only be assumed since data on related factors, such as smoking, weight gain during pregnancy or type of fetal growth retardation, were unavailable.

By contrast, the odds of respiratory conditions of fetus and newborn among births to older multiparous women were significantly lower than for births to women aged 20-29.

Table 4
Crude odds ratios for births with perinatal complications, by parity and maternal age, British Columbia, 1987 to 1994

Perinatal complications (ICD-9 codes)	Maternal age: 30 - 34 Odds ratio	30 - 34 95% confidence interval	35 and older Odds ratio	35 and older 95% confidence interval
Fetal growth retardation, SGA, fetal malnutrition† (764.0 - 764.9)				
Primiparous	1.04	.95, 1.14	1.36*	1.19, 1.54
Multiparous	.87*	.80, .95	1.00	.90, 1.12
Birth trauma (767.0 - 767.9)				
Primiparous	1.13	.91, 1.41	1.05	.73, 1.51
Multiparous	.84	.66, 1.09	.94	.68, 1.31
Intrauterine hypoxia and birth asphyxia (768.0 - 768.9)				
Primiparous	1.03	.99, 1.06	1.09*	1.04, 1.15
Multiparous	1.02	.99, 1.05	1.08*	1.04, 1.12
Respiratory conditions of fetus and newborn (769, 770.0 - 770.9)				
Primiparous	.85	.71, 1.02	.86	.64, 1.16
Multiparous	.84*	.72, .99	.74*	.58, .94
Isoimmunization disorders and perinatal jaundice (773.0 - 774.7)				
Primiparous	.68	.31, 1.46	1.86	.81, 4.14
Multiparous	.82	.55, 1.20	.88	.52, 1.48

Data source: *British Columbia Birth Registry, B.C. Vital Statistics Agency*
Note: *The odds ratios were derived from counts of live born and stillborn infants. Maternal age group 20-29 was used as the reference group.*
† Small for gestational age (SGA) code(s) applied to infants with inappropriate weight for their gestation based on Lubchenko growth chart (reference 13), and/or manifestation of malnutrition.
** $p \leq 0.05$*

Congenital anomalies

The risk of chromosomal anomalies—Down syndrome, for the most part—was elevated among older mothers (Table 5). For example, the odds of having an infant with a chromosomal defect for multiparous women aged 35 and older were more than four times those for mothers in the youngest age group. Among first-time mothers aged 35 and older, the odds were also significantly high (odds ratio 3.07).

Despite the elevated risk, the incidence of chromosomal anomalies was very small. For example, among multiparous women, 0.32% of infants born to mothers aged 35 and older had chromosomal anomalies, compared with 0.13% of

infants of mothers aged 30-34, and 0.08% of infants of mothers aged 20-29. It has been well documented that the risk of bearing a child with Down syndrome increases with maternal age, although the risk noted elsewhere has been greater than was found here.[15]

In addition, the odds of congenital anomalies of the respiratory system among infants born to primiparous women aged 35 and older were significantly high (odds ratio 2.76).

Table 5
Crude odds ratios for births with congenital anomalies, by parity and maternal age, British Columbia, 1987 to 1994

	Maternal age			
	30 - 34		35 and older	
Congenital anomalies (ICD-9 codes)	Odds ratio	95% confidence interval	Odds ratio	95% confidence interval
All anomalies (740.0 -759.9)				
Primiparous	1.11*	1.08, 1.14	1.23*	1.18, 1.28
Multiparous	1.04*	1.02, 1.06	1.16*	1.13, 1.19
Brain, nervous system and spinal cord (740.0 - 742.9)				
Primiparous	.78	.51, 1.19	.64	.29, 1.36
Multiparous	.90	.66, 1.23	.73	.46, 1.15
Ear, face and neck (744.0 - 744.9)				
Primiparous	.96	.61, 1.51	.66	.26, 1.56
Multiparous	.67*	.46, .97	.76	.46, 1.24
Heart (745.0 - 746.9)				
Primiparous	.91	.59, 1.41	1.46	.81, 2.57
Multiparous	.67*	.46, .97	.92	.58, 1.44
Respiratory system (748.0 - 748.9)				
Primiparous	.34	.08, 1.16	2.76*	1.16, 6.36
Multiparous	.95	.49, 1.80	1.17	.51, 2.59
Musculoskeletal anomalies (754.0 - 756.9)				
Primiparous	1.02	.88, 1.19	.94	.73, 1.22
Multiparous	1.07	.93, 1.23	.97	.80, 1.18
Chromosomal anomalies (758.0 - 758.9)				
Primiparous	1.64*	1.09, 2.48	3.07*	1.86, 5.02
Multiparous	1.62*	1.18, 2.22	4.16*	3.06, 5.66

Data source: *British Columbia Birth Registry, B.C. Vital Statistics Agency*
Note: *The odds ratios were derived from counts of live born and stillborn infants. Maternal age group 20-29 was used as the reference group.*
** $p \leq 0.05$*

Concluding remarks

For both parity groups, the odds of having a cesarean delivery increased with maternal age. An elevated risk of a low birth weight infant and preterm birth was also found for older primiparous women. For all congenital anomalies combined, there was a slightly higher risk for infants of older mothers, and for chromosomal anomalies in particular, there was a significant difference. The risk of some maternal complications increased with age, yet for most perinatal complications there was no clear age effect.

While childbearing at older ages increases certain negative health impacts to both the mother and her infant, health concerns are not the only factors influencing Canadian women and their partners. Social, economic and personal factors also play a role in family planning. And given the numerous and conflicting forces that affect the timing of childbearing, it is not surprising that these decisions are perhaps more complex for women today than for their mothers.

References

1 Ford D, Nault F. Changing fertility patterns, 1974 to 1994. *Health Reports* (Statistics Canada, Catalogue 82-003-XPB) 1996; 8(3): 39-46.

2 Cunningham FG, Leveno KJ. Childbearing among older women—The message is cautiously optimistic. *The New England Journal of Medicine* 1995; 333(15): 1002-4.

3 Cnattingius S, Forman MR, Berendes HW, et al. Delayed childbearing and risk of adverse perinatal outcome. *Journal of the American Medical Association* 1992; 268(7): 886-90.

4 Melchor JC, Rodriguez-Alarcon J, Fernandez-Llebrz L, et al. Delayed childbearing and pregnancy outcome. *Zentralbl Gynakol* 1994; 116: 566-70.

5 Mikulandra F, Perisa M, Merlak I, et al. Pregnancy and delivery in women aged 35 years and over. *Zentralblatt fur Gynakologie* 1993; 115; 171-6.

6 Gordon D, Milbery J, Daling J, et al. Advanced maternal age as a risk factor for caesarean delivery. *Obstetrics and Gynecology* 1991; 77(4): 493-7.

7 Barkan SE, Bracken MB. Delayed childbearing: No evidence for increased risk of low birth weight and preterm delivery. *American Journal of Epidemiology* 1987; 125(1): 101-9.

8 Kirz DS, Dorchester W, Freeman RK. Advanced maternal age: The mature gravida. *American Journal of Obstetrics and Gynecology* 1984; 152(1): 7-12.

9 Breslow NE, Day NE. *Statistical Methods in Cancer Research Volume 1 - The Analysis of Case - Control Studies*. Lyon: IARC Scientific Publications, 1990.

10 Millar WJ, Wadhera S, Nimrod C. Multiple births: Trends and patterns in Canada, 1974-1990. *Health Reports* (Statistics Canada, Catalogue 82-003) 1997; 4(3): 223-50.

11 MacNab YC. A review of delivery mode in British Columbia, 1987-1995. *Quarterly Digest* (British Columbia Vital Statistics Agency, Ministry of Health and Ministry Responsible for Seniors) 1997; 6(4): 18-36.

12 Frette RC, Schmittdiel J, McLean FH, et al. Increased maternal age and the risk of fetal death. *New England Journal of Medicine* 1995; 333(15): 953-7.

13 Lubchenko LO, Hansman C, Dressler M, et al. Intrauterine growth as estimated from liveborn birth-weight data at 24 to 42 weeks of gestation. *Pediatrics* 1963; 32: 793-800.

14 Reeder SJ, Martin LL, Koniak, D (editors). *Maternity Nursing, Family, Newborn, and Women's Health Care*. 7th ed. Philadelphia: J.B. Lippincott Company, 1992.

15 Magalini S, Scrascia E. *Medical Syndromes*. 2nd ed. Philadelphia: J.B. Lippincott Company, 1981.

Appendix

Table A

Births by adverse pregnancy outcomes, parity, and maternal age, British Columbia, 1987 to 1994

Pregnancy outcomes	Maternal age					
	20 - 29		30 - 34		35 and older	
	Number	%	Number	%	Number	%
All births						
Primiparous	**97,944**	**100.0**	**32,371**	**100.0**	**10,509**	**100.0**
Multiparous	**103,199**	**100.0**	**68,676**	**100.0**	**29,520**	**100.0**
Cesarean section						
Primiparous	21,055	21.5	8,895	27.5	3,647	34.7
Multiparous	18,598	18.0	14,197	20.7	7,056	23.9
First cesarean	4,933	4.8	3,638	5.3	1,997	6.8
Repeat cesarean	13,665	13.2	10,559	15.4	5,059	17.1
Low birth weight†						
Primiparous	6,031	6.2	2,314	7.2	958	9.1
Multiparous	5,342	5.2	3,349	4.9	1,592	5.4
Preterm‡						
Primiparous	6,679	6.8	2,772	8.6	1,105	10.5
Multiparous	6,397	6.2	4,075	5.9	2,114	7.2
Stillbirth						
Primiparous	655	0.7	235	0.7	105	1.0
Multiparous	603	0.6	392	0.6	235	0.8

Data source: *British Columbia Birth Registry, B.C. Vital Statistics Agency*
Note: *Derived from counts of live born and stillborn infants. Individuals with more than one condition within a category were counted only once in that category. However, an individual with conditions in more than one category was counted in each one.*
† Less than 2,500 g
‡ Gestation less than 37 weeks

Table B
Births with maternal complications, by parity and maternal age, British Columbia, 1987 to 1994

Maternal complications (ICD-9 codes)	Maternal age					
	20 - 29		30 - 34		35 and older	
	Number	%	Number	%	Number	%
All births						
Primiparous	**97,944**	**100.0**	**32,371**	**100.0**	**10,509**	**100.0**
Multiparous	**103,199**	**100.0**	**68,676**	**100.0**	**29,520**	**100.0**
Antepartum hemorrhage (640.0- 641.9)						
Primiparous	967	1.0	438	1.4	222	2.1
Multiparous	1,211	1.2	898	1.3	478	1.6
Hypertension/eclampsia (642.0 - 642.9)						
Primiparous	3,183	3.3	1,123	3.5	468	4.5
Multiparous	1,077	1.0	888	1.3	572	1.9
Diabetes mellitus and gestational diabetes (648.0, 648.8)						
Primiparous	1,586	1.6	929	2.9	441	4.2
Multiparous	1,368	1.3	1,623	2.4	1,102	3.7
Multiple gestation (651.0 - 651.9)						
Primiparous	1,768	1.8	844	2.6	324	3.1
Multiparous	2,278	2.2	1,559	2.3	597	2.0
Malposition and malpresentation of fetus, disproportion and obstructed labour (652.0 - 653.9, 660.0 - 660.9)						
Primiparous	13,014	13.3	5,444	16.8	1,923	18.3
Multiparous	5,173	5.0	4,023	5.9	1,926	6.5
Abnormality of reproductive organs (654.0 - 654.9)						
Primiparous	466	0.5	364	1.1	203	1.9
Multiparous	6,611	6.4	4,959	7.2	2,338	7.9
Fetal abnormality affecting mother (655.0 - 656.9)						
Primiparous	6,022	6.2	2,424	7.5	961	9.1
Multiparous	3,249	3.2	2,274	3.3	1,180	4.0
Abnormality of forces of labour and prolonged labour (661.0 - 662.3)						
Primiparous	5,108	5.2	2,138	6.6	771	7.3
Multiparous	1,483	1.4	1,144	1.7	559	1.9
Complications of umbilical cord (663.0 - 663.9)						
Primiparous	1,122	1.2	352	1.1	113	1.1
Multiparous	1,050	1.0	727	1.1	331	1.1
Obstetrical trauma (664.0 - 665.9)						
Primiparous	725	0.7	284	0.9	71	0.7
Multiparous	468	0.5	343	0.5	146	0.5
Postpartum hemorrhage (666.0 - 666.3)						
Primiparous	1,033	1.1	329	1.0	97	0.9
Multiparous	1,011	1.0	511	0.7	194	0.7

Data Source: *British Columbia Birth Registry, B.C. Vital Statistics Agency*
Note: *Derived from counts of live born and stillborn infants. Individuals with more than one condition within a category were counted only once in that category. However, an individual with conditions in more than one category was counted in each one.*

Table C

Births with perinatal complications, by parity and maternal age, British Columbia, 1987 to 1994

Perinatal complications (ICD-9 codes)	Maternal age					
	20 - 29		30 - 34		35 and older	
	No.	%	No.	%	No.	%
All births						
Primiparous	**97,944**	**100.0**	**32,371**	**100.0**	**10,509**	**100.0**
Multiparous	**103,199**	**100.0**	**68,676**	**100.0**	**29,520**	**100.0**
Fetal growth retardation, SGA, fetal malnutrition† (764.0 - 764.9)						
Primiparous	1,964	2.0	676	2.1	284	2.7
Multiparous	1,459	1.4	847	1.2	419	1.4
Birth trauma (767.0 - 767.9)						
Primiparous	310	0.3	116	0.4	35	0.3
Multiparous	178	0.2	100	0.2	48	0.2
Intrauterine hypoxia and birth asphyxia (768.0 - 768.9)						
Primiparous	18,154	18.5	6,132	18.9	2,088	19.9
Multiparous	14,490	14.0	9,792	14.3	4,416	15.0
Respiratory conditions of fetus and newborn (769, 770.0 - 770.9)						
Primiparous	550	0.6	155	0.5	51	0.5
Multiparous	415	0.4	233	0.3	88	0.3
Isoimmunization disorders and perinatal jaundice (773.0 - 774.7)						
Primiparous	40	- -	9	- -	8	0.1
Multiparous	79	0.1	43	0.1	20	0.1

Data source: *British Columbia Birth Registry, B.C. Vital Statistics Agency*
Note: *Derived from counts of live born and stillborn infants. Individuals with more than one condition within a category were counted only once in that category. However, an individual with conditions in more than one category was counted in each one.*
† Small for gestational age (SGA) code(s) applied to infants with inappropriate weight for their gestation based on Lubchenko growth chart (reference 13) and/or manifestation of malnutrition.
- - Amount too small to be expressed

Table D

Births with congenital anomalies, by parity and maternal age, British Columbia, 1987 to 1994

Congenital anomalies (ICD-9 codes)	Maternal age					
	20-29		30 - 34		35 and older	
	No.	%	No.	%	No.	%
All births						
Primiparous	**97,944**	**100.0**	**32,371**	**100.0**	**10,509**	**100.0**
Multiparous	**103,199**	**100.0**	**68,676**	**100.0**	**29,520**	**100.0**
All congenital anomalies (740.0 -759.9)						
Primiparous	38,431	39.2	13,519	41.8	4,648	44.2
Multiparous	33,987	32.9	23,201	33.8	10,692	36.2
Brain, nervous system and spinal cord (740.0 - 742.9)						
Primiparous	116	0.1	30	0.1	8	0.1
Multiparous	115	0.1	69	0.1	24	0.1
Ear, face and neck (744.0 - 744.9)						
Primiparous	85	0.1	27	0.1	6	0.1
Multiparous	97	0.1	43	0.1	21	0.1
Heart (745.0 - 746.9)						
Primiparous	96	0.1	29	0.1	15	0.1
Multiparous	99	0.1	44	0.1	26	0.1
Respiratory system (748.0 - 748.9)						
Primiparous	27	- -	3	- -	8	0.1
Multiparous	27	- -	17	- -	9	- -
Musculoskeletal anomalies (754.0 - 756.9)						
Primiparous	672	0.7	227	0.7	68	0.7
Multiparous	486	0.5	345	0.5	135	0.5
Chromosomal anomalies (758.0 - 758.9)						
Primiparous	70	0.1	38	0.1	23	0.2
Multiparous	80	0.1	86	0.1	95	0.3

Data source: *British Columbia Birth Registry, B.C. Vital Statistics Agency*
Note: *Derived from counts of live born and stillborn infants. Individuals with more than one condition within a category were counted only once in that category. However, an individual with conditions in more than one category was counted in each one.*
- - Amount too small to be expressed