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**Central East  
Health Information Partnership**

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**Underreporting of live births in  
Ontario: 1991-1997**

*February 2001*



# Underreporting of live births in Ontario: 1991-1997

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*Funded by the CEHIP Student Award Program*

February 2001



## **ACKNOWLEDGEMENTS**

The authors wish to thank Dr. Hyewon Lee-Han for her efforts in getting this study underway and for assisting in the development of this report. We also would like to thank Indira Singh for her cooperation and Paul Inkila for his valuable assistance with the collection and provision of data for this report.

Data entry for unreported births was financially supported by the Central West Health Planning Information Network, the Northern Health Information Partnership, the Southwest Region Health Information Partnership, and the Health Information Partnership, Eastern Ontario Region.

## **EXECUTIVE SUMMARY**

One of the data sets very commonly used by public health professionals and health planners is the live birth database compiled by the Office of the Registrar General, Ontario Ministry of Consumer and Commercial Relations. These data are used by federal, provincial, and municipal agencies to plan health programs and to forecast future population growth.

The live birth database requires documentation from both the parents and the attending physician. However, in some instances the ORG does not receive one of these pieces of documentation and the birth event goes unrecorded in the live birth database. Our study looks at the prevalence of these unrecorded events and their association with maternal characteristics, birth outcomes, and municipal birth registration fees that have been introduced by some municipalities.

Results of our study show that the percentage of births going unrecorded in the live birth data base has increased from less than 1% in the early 1990's to over 3% in 1998. These unregistered births are more prevalent in some municipalities than others, with some exceeding 5% in 1997. Municipalities with birth registration fees were found to have a greater prevalence of unregistered births. Unregistered births also were found to be more frequently associated with teen-age mothers and babies of lower birth weights. All of these findings have implications to health planning and public health programs and require further investigation.

## INTRODUCTION

Ontario vital statistics are collected by the Office of the Registrar General (ORG), Ontario Ministry of Consumer and Commercial Relations. For a live birth to be registered and included in the final statistics produced by the ORG and Statistics Canada, the ORG must receive two separate forms, one completed by the parents, and the second by the attending health practitioner (usually a physician). For a small proportion of births each year, the ORG receives only one of these two required forms: these births have not been included in the Ontario vital statistics data. Each year, a file of registered births is compiled that includes births for which both forms were received. This is the file used by the ORG to calculate birth statistics. It is also the file that is passed on to Statistics Canada and subsequently distributed to the Ontario Ministry of Health and Long-Term Care.

Unregistered births can be problematic. If large numbers of births are unregistered, and/or if these unregistered births are not randomly distributed across the province, then some local public health and health planning agencies may not be receiving accurate information about the pregnancy, birth and fertility rates in their respective areas. Similarly, the characteristics of the unregistered births and the mothers (e.g. maternal age, infant birth weight, etc.) may be different from those associated with the registered births, which could have a significant impact on public health programs.

Changes to Ontario law in 1996 allowed municipalities to introduce an administrative fee for processing birth registration documentation. This fee, which has been found to range from \$10 to \$27.50 in those municipalities that have implemented it, may discourage parents from submitting their birth registration documents. In such a case, the ORG would receive only the attending health professional's documentation, and the birth would not be included in the Ontario vital statistics data. Thus, the implementation of the fee could serve to further decrease the completeness of the vital statistics data. In particular, the disincentive to birth registration could be disproportionately affecting certain segments of the population such as teen-aged mothers.

The purpose of this paper is to examine the effects of unregistered births in Ontario upon the vital statistics information as it might be used by health planners and other public health professionals. For this report, an **unregistered birth** is defined as a birth event that is not included in the official Ontario vital statistics data as distributed by Statistics Canada and subsequently by the Ontario Ministry of Health and Long-Term Care. There were three main objectives:

1. To examine the impact of the unregistered births on birth counts;

2. To assess the associations between maternal and pregnancy factors and birth registration;
3. To examine the impact of municipal birth registration fees on birth registration.

## **METHODS AND ANALYSIS**

### **Data sources**

In the spring of 1999, CEHIP and the Ontario Ministry of Health and Long-Term Care (MOHLTC), became aware of the existence of unregistered birth documentation at the ORG. Following this, a Memorandum of Understanding involving the five Ontario Health Intelligence Units, the MOHLTC, and the ORG was drafted and signed. This document outlined the process whereby the ORG would enter the unregistered birth documentation into an electronic data file and forward this file to CEHIP. CEHIP was identified as the lead agency on the project and was responsible for managing the project to its completion, including the data analysis and the documentation and distribution of the findings.

For the purposes of this project, the ORG prepared a database containing the information on births between 1991 and 1997 for which they received only one of the two required forms (usually the form from the attending medical professional). The ORG file of registered births for the same period was also obtained. These two files were used to examine the characteristics of unregistered births and to compare them to the overall Ontario birth profile.

Municipal fees for birth registration were identified through a survey of Ontario's municipal clerks. The Association of Municipalities of Ontario, on behalf of the Central East Health Information Partnership, faxed this survey to all Ontario clerk's offices in February 2000 (see Appendix 1 for a copy of the survey form). Follow-up telephone calls were made to a few of the larger Ontario municipalities that did not respond to the survey.

### **Inclusions and exclusions**

A number of exclusions were used with these data. To ensure that reported births were likely to be true live births, all records of live births less than 500g and less than 20 weeks gestation were removed from the analysis (Joseph & Kramer 1997).

Geographic analyses were performed based on residential postal codes reported in the data files. Postal codes were chosen as the basis for residence rather than the residence codes assigned by the ORG and Statistics Canada due to errors that have been found associated with these codes (Woodward & Ardal 2000). The intent in using the postal code as the basis for residence was not to

determine the absolute number of births in a given geographic area, but rather to assign residence to the registered and unregistered records in a consistent and reliable fashion. Records with incomplete and invalid postal codes were excluded. This resulted in the loss of approximately 7% of all records from 1991 to 1997. However, this percentage was 4% or less for the last 4 years analyzed, 1994-1997 (Table 1).

**Table 1. Percentage of unregistered and registered birth records excluded from analyses due to incomplete or invalid postal codes.**

<b>Year</b>	<b>Unregistered</b>	<b>Registered</b>	<b>Total</b>
1991	8.2 %	23.2 %	23.1 %
1992	7.5 %	6.8 %	6.8 %
1993	5.2 %	5.7 %	5.7 %
1994	4.0 %	3.8 %	3.8 %
1995	3.1 %	4.0 %	4.0 %
1996	2.6 %	3.7 %	3.7 %
1997	2.5 %	3.4 %	3.3 %
1991-97	4.1 %	7.4 %	7.3 %

Geographic analysis was carried out in two stages. Initial analysis focused on urban versus rural areas of residence, followed by a more detailed census subdivision (CSD) level analysis. Because conversion of postal code into CSD is relatively accurate in urban areas, but less so in rural areas, records with rural postal codes were examined in aggregate, and then excluded from the more detailed CSD level analyses. All postal codes with a “0” for the second character were defined as rural codes, as were those classified as rural by the Delivery Mode Type (“W” or “H”) in the Statistics Canada Postal Code Conversion File (Statistics Canada 1999). In addition, postal codes with a postal box Delivery Mode Type (“K” or “M”) were excluded from the urban analysis, due to the inherent differences between residence and postal box location as described by Statistics Canada.

Based on the Single Link Indicator<sup>a</sup> of the Postal Code Conversion File, urban postal codes were used to assign a CSD (municipality) to each birth record. In a number of municipalities the

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<sup>a</sup> When a postal code falls within more than one enumeration area, the single link indicator allocates the postal code to a single enumeration area based on address (dwelling) counts. As an enumeration area is assigned to a CSD and CD, the postal code assigned to that enumeration area also becomes assigned to the associated CD and CSD.

majority of postal codes were classified as rural but a few postal codes were classified as urban. To avoid using postal code conversions that may be less accurate, and to create consistency when dealing with these municipalities, only records meeting specific criteria were included in the municipality-level analysis. Urban records from a CSD were included if and only if the municipality met one of the following conditions:

1) All (100%) of postal codes in the municipality were classified as urban;

OR

2) There were more than 5 records with postal codes considered as urban, **and** at least 50% of the postal codes within the municipality were considered urban.

### **Analyses**

The proportion of unregistered births was examined on a temporal and spatial basis: by year, by residence (urban vs. rural; municipality), and by year and residence combined.

A number of variables from the birth data were examined for their association with unregistered births residing in urban areas. These variables addressed mother's age, length of gestation, birth weight, gender, and multiple births. Associations between these variables and unregistered births were also examined by year and by geographic location.

Changes in the proportions of unregistered births residing in urban areas were examined over time by fee status. Residence information and the birth variables described above were also examined by fee status for those births residing in urban areas.



## RESULTS AND DISCUSSION

### Study population

The data set for analysis consisted of a total of 927,152 birth records from 1991 through 1997 with valid Ontario postal codes for maternal residence, birth weights of at least 500g and gestational age of 20 weeks or greater. Of these, 9,629 (1.04%) were missing one of the two forms required for registration, and therefore were not registered by the ORG.

### Proportion of births missing by year

As shown in Figure 1, the number and percentage of all live births that went unregistered was quite stable

between 1991 and 1996, with about

1,000 births

(approx. 0.7%)

being unregistered

each year. In 1997

the number of

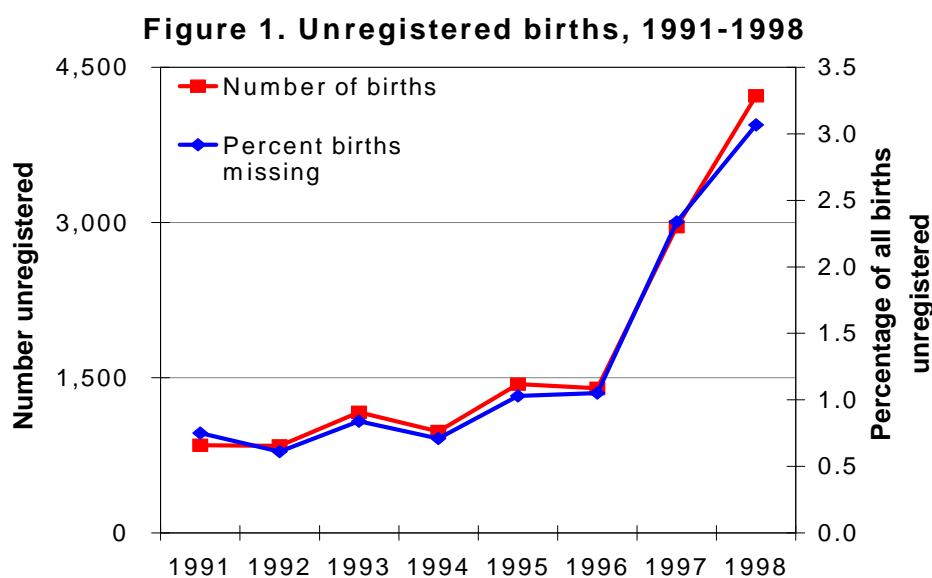
births unregistered

more than doubled,

to almost 3,000

(2.3% of all births),

and aggregate data for 1998 (personal communication, Paul Inkila, ORG) show a continued increase to 4,225 (3.1%) unregistered births.



### Proportion of missing births by geographic location

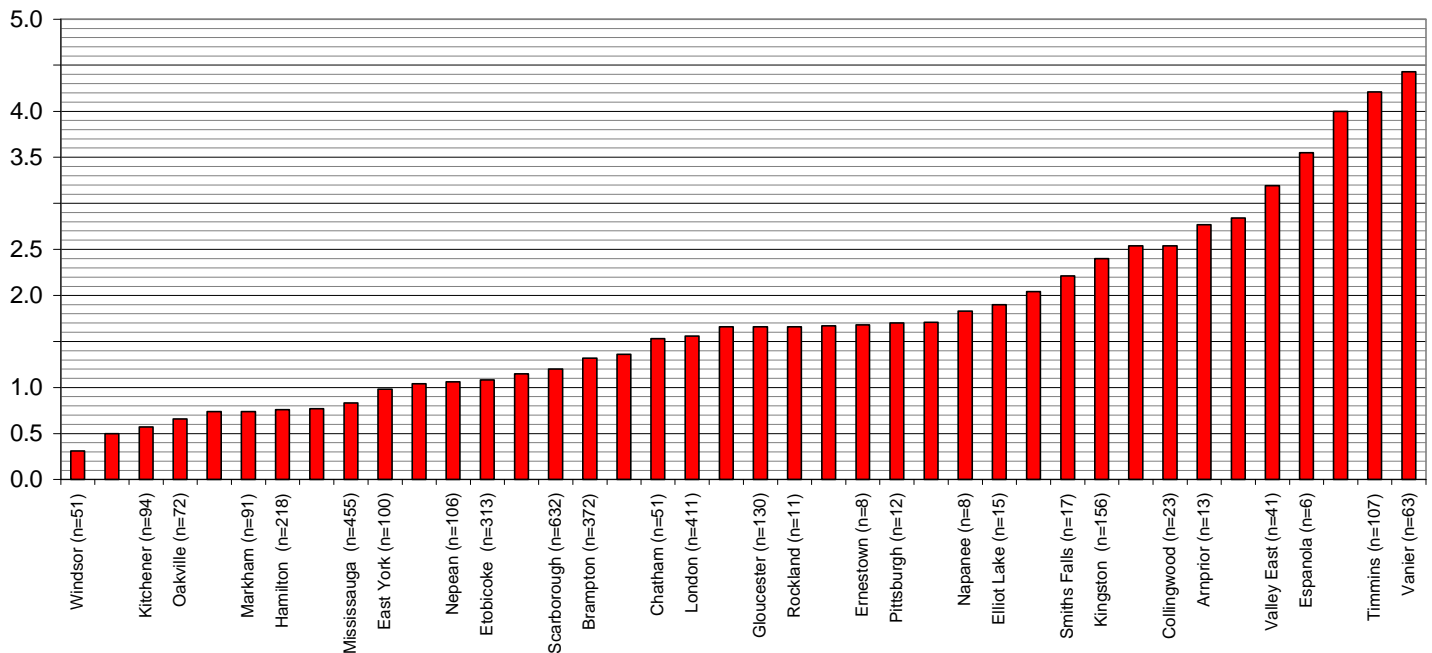
The proportions of unregistered births in urban and rural locations are presented along with the total numbers by year in Table 2. Although the overall numbers of births to mothers with rural residences are less (182,000 vs. 745,000), the proportion of those births that are unregistered (0.9%) is similar to the proportion of urban residence births unregistered (1.1%). However, the increase in the proportion of unregistered births in 1997 appears to be larger in the urban areas compared to rural.

**Table 2. Numbers of registered and unregistered births in Ontario by location, 1991-1997.**

YEAR	URBAN (N=744,883 births)		RURAL (N=182,269 births)		TOTAL (see fig 1. above) (N=927,152 births)	
	Unregistered	Registered	Unregistered	Registered	Unregistered	Registered
1991	685 (0.76%)	89,145	163 (0.68%)	23,798	848 (0.75%)	112,943
1992	676 (0.62%)	108,640	166 (0.57%)	29,089	842 (0.61%)	137,729
1993	931 (0.84%)	109,540	235 (0.85%)	27,354	1,166 (0.84%)	136,894
1994	785 (0.71%)	110,302	195 (0.73%)	26,701	980 (0.71%)	137,003
1995	1,201 (1.06%)	111,799	236 (0.89%)	26,321	1,437 (1.03%)	138,120
1996	1,147 (1.06%)	107,241	250 (1.02%)	24,331	1,397 (1.05%)	131,572
1997	2,551 (2.48%)	100,240	408 (1.74%)	23,022	2,959 (2.34%)	123,262
<b>Total</b>	<b>7,976 (1.07%)</b>	<b>736,907</b>	<b>1,653 (0.91%)</b>	<b>180,616</b>	<b>9,629 (1.04%)</b>	<b>917,523</b>

All further analyses of unregistered births were based on births with non-rural postal codes, as described in the methods section. A total of 733,010 births, of which 7,868 (1.07%) were unregistered, were included in these analyses. Unregistered births were more common in some municipalities than others, and this changed over time as well (see full details in Appendix 2). The

**Figure 2. Percentage of births unregistered, 1991-1997, for selected municipalities**



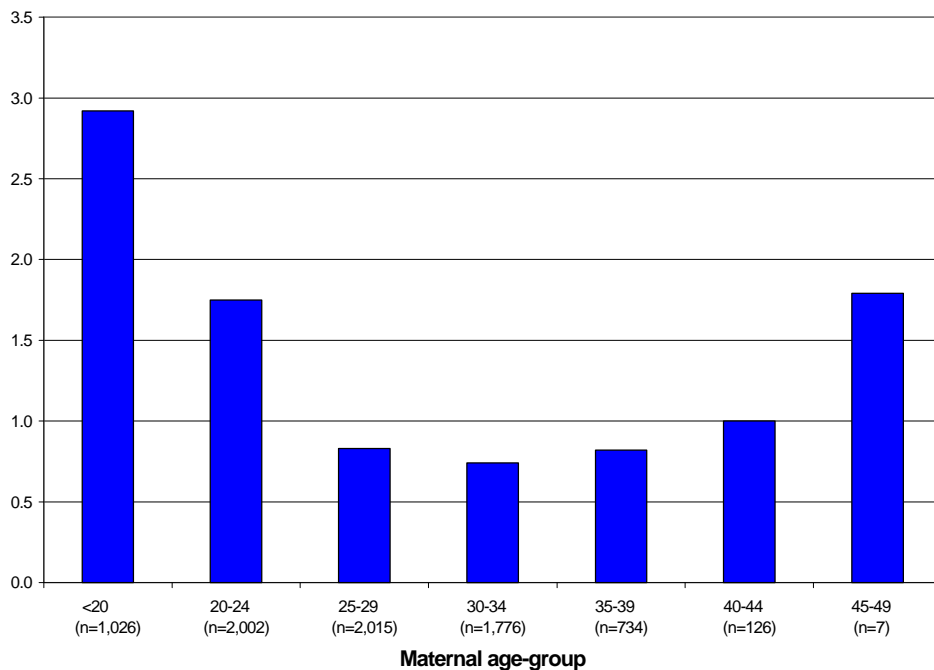
percentage of unregistered births in 1996 and 1997 has increased substantially for some municipalities, such as Kingston and Ottawa-Carleton. Figure 2 shows the percentage of unregistered births for selected municipalities for the years 1991-1997 combined. All municipalities

where more than 1.5% of total births were unregistered, or having more than 10,000 total births are presented.

### Maternal and pregnancy factors

The mean maternal age for registered births, 1991 through 1997, was 28.9 years (SD 5.2 years). The mean age of mothers whose births went unregistered was significantly lower, at 26.7

**Figure 3. Percentage of live births unregistered in Ontario, 1991-1997, by maternal age-group**



years (SD 6.1 years;  $p=0.0001$ ; t-test assuming unequal variances). This difference in age distribution is clearly demonstrated in Figure 3, which shows the percentage of births unregistered in each five-year maternal age group. Almost 3 percent of births to teen-age mothers went unregistered, whereas less than 1 percent of

births to mothers aged 30 years and older went unregistered.

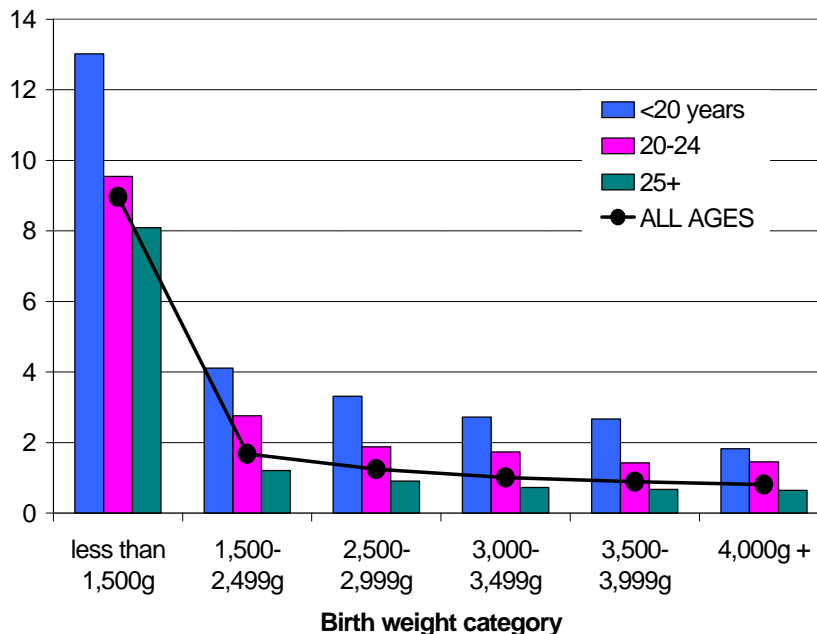
It is important to note that 65% of all births are to mothers between the ages of 25 and 34. Thus, although the percentages of unregistered births within these age groups are lower than among younger ages, they nonetheless account for 3,791 (48%) of the 7,868 unregistered births analysed.

Examination of the data revealed no differences in the infant's gender but slight difference relating to multiple births. Less than 2% of all births were multiple births. However, these multiple births were less likely to be registered than singleton births. The proportion of births unregistered increases with the increasing parity of the pregnancy, from 1.8% for twin births to 5.7% for the few quadruple births recorded (analysis not shown).

As described in the methods section, all records with birth weights of less than 500g were excluded from the analysis. All other birth weights were categorized as seen in Figure 4 below, which shows the proportion of births in each category that were unregistered.

The proportion of births unregistered was highest among the lowest birth weight infants, with 1.7% of births of low birth weight infants (i.e.

**Figure 4. Percentage of births unregistered, 1991-1997, by birthweight category and maternal age group**

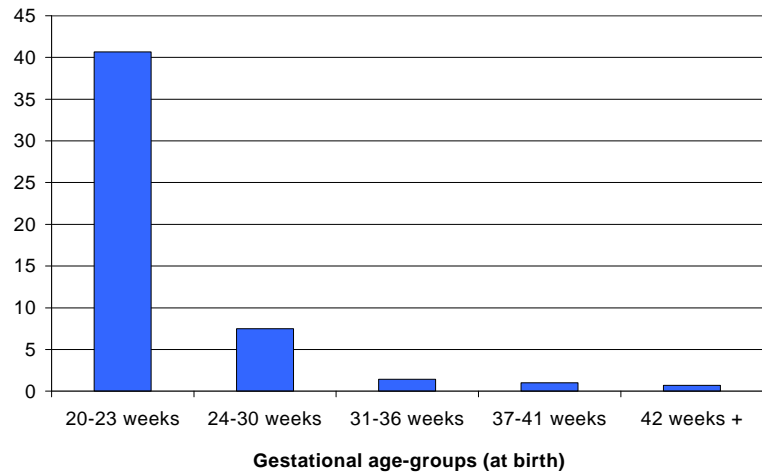


<2,500g) and 8.9% of the very low birth weight infants (<1,500g) being unregistered. The proportion of births unregistered decreased steadily with increasing infant birth weight; less than 1% of births weighing 3,000g or more were unregistered.

Figure 4 also presents the proportions of births unregistered by birth weight for three maternal age categories. As expected from the earlier findings regarding maternal age, the greatest proportion of unregistered births was among mothers aged less than 20 years, and this proportion decreased with increasing maternal age for all weight categories. Differences in the proportions of unregistered births among mothers aged 25-44 years were small, and the shape of the relationship was similar, so these were combined for the presentation. Births to women aged 45 and older were rare (390 in total, only 7 unregistered), and are not presented in Figure 4.

Gestational age was also examined. The number of unregistered births was much higher among the births with the shortest length of gestation, with 9.8 percent of births prior to 31 weeks being unregistered. These results are presented in Figure 5.

**Figure 5. Percentage of births unregistered, 1991-1997, by gestational age at birth**



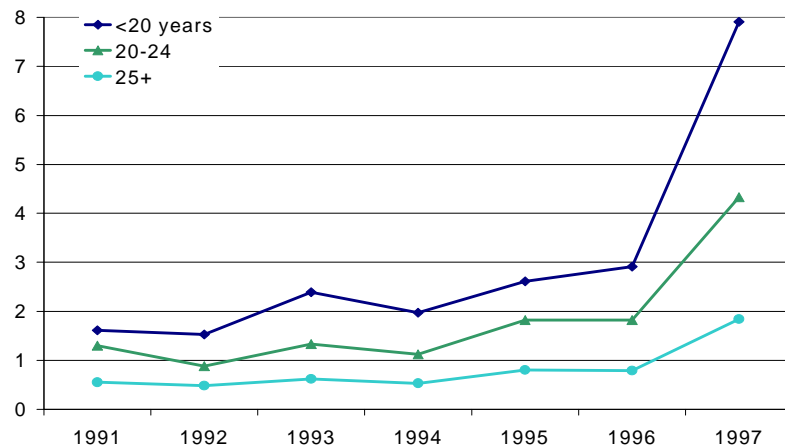
**Temporal and spatial differences in maternal and birth characteristics**

Temporal and spatial examination of the data was performed to further explore the observed differences in registration of births by certain maternal and birth characteristics. Maternal age, infant birth weight, and gestational age each were examined by year and by municipality, and compared with the previous results.

**Maternal age**

Overall, about 5% of births were to mothers aged less than 20 years, another 15% were to mothers aged 20 to 24 years, and the remaining 80% were to mothers aged 25 years and older. The maternal age distribution was found to

**Figure 6. Percentage of births unregistered by maternal age group and year**



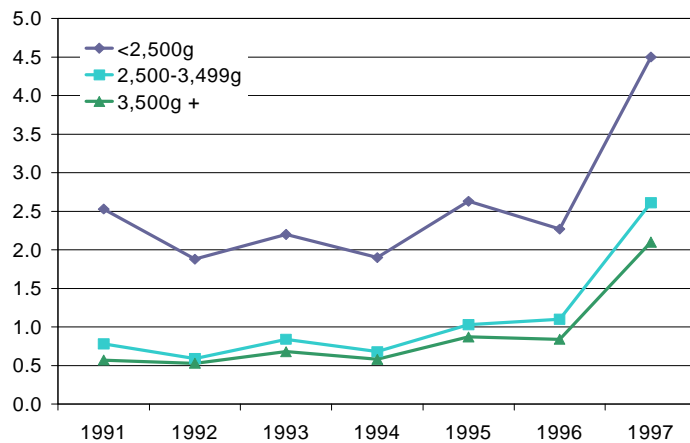
vary widely between municipalities (analysis not shown). The proportion of births unregistered by maternal age group and year are presented in Figure 6. The overall trend is the same within each of the maternal age groups: relatively stable and smaller percentages of unregistered births until 1996, followed by an increased proportion of births unregistered in 1997. For maternal age groups over 20 years old, the increase from 1996 to 1997 was about two-fold over the average percentage between 1991 and 1996, while among mothers aged less than 20 years, the increase from 1996 to

1997 was about 3 times the average level between 1991 and 1996. Once again, the percentage of births unregistered was consistently higher when the mother was under age 20, and the proportion decreased with increasing maternal age. Over this same time period, the overall maternal age distribution remained relatively stable. Thus, it does not appear that changes in the proportions of births registered between 1991 and 1997 can be explained by changes in maternal age distribution.

**Infant birth weight and gestational age**

Infant birth weight and gestational age were both found to be associated with birth registration. Both birth weights and gestational ages also were found to vary among municipalities (analysis not shown). Lower weight infants were less likely to be registered. Increases in unregistered births in 1997 were

**Figure 7. Percentage of births unregistered by birthweight category and by year**



similar within each birth weight category (Figure 7). A similar change over time was seen for proportions of unregistered births by gestational age group (graph not shown)<sup>b</sup>. Although the proportion of lower weight births and pre-term births increased slightly over the same 1991-1997 time period (Ennis, Woodward, and Ardal 2000), this change does not appear to account for the great increase in the proportion of births unregistered in 1997.

**Effect of municipal birth registration fees:**

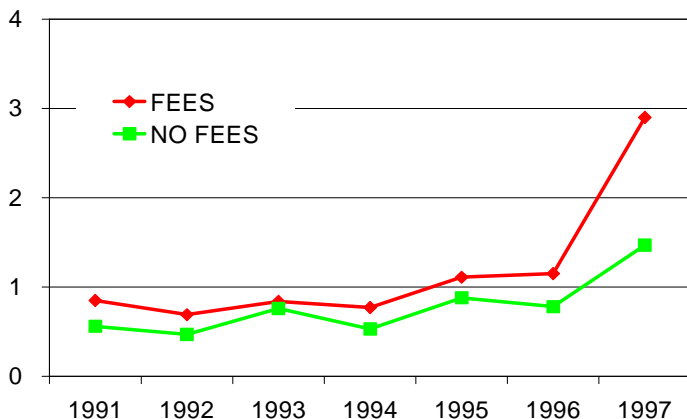
Of the 133 urban municipalities examined, 54 did not charge an administrative fee for birth registration, 37 charged a fee ranging from \$10 to \$27.50, and 42 municipalities did not respond to the survey. However, only 21.6 percent of births were to residents of a municipality where no fee is charged and a further 9 percent were to residents of a municipality where the fee-charging status is

<sup>b</sup> The accuracy of the gestation field in the live birth database has been questioned. Although the data received for this project have been partially corrected, the authors felt that detailed analysis and presentation of this field should

unknown. The remaining 69.4% of the births were linked to residents of a municipality where an administrative registration fee is charged. These fees were implemented in mid-1996 and 1997.

Figure 8 shows the proportions of unregistered births in each year of the study period for

**Figure 8. Percentage of births unregistered by year and fee-charging status of the municipality.**

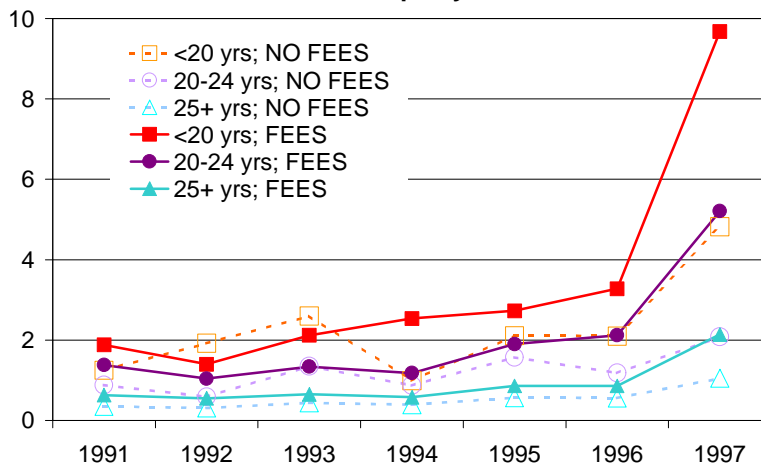


those municipalities where the administrative fee status is known. It is interesting to note that the proportions of unregistered births are consistently higher in the municipalities where an administrative fee was introduced in 1996/1997 than in those areas where no fee is charged.

Furthermore, both groups show an increase in the proportion of births unregistered in 1997. However, the increase appears greater in the municipalities where a fee was introduced. More detailed information for each municipality is provided in Appendix 2.

The association of the registration fee with maternal age is shown in Figure 9. Once again, a consistent effect of age is apparent, with a higher proportion of births to younger mothers being unregistered. However, the effect of the introduction of fees appears to be different among the three age groups, with registrations of births to older mothers being less affected than births to teen mothers. In particular, while the proportion of unregistered births among teen mothers in

**Figure 9. Percentage of births unregistered by year, maternal age group, and fee-charging status of municipality**

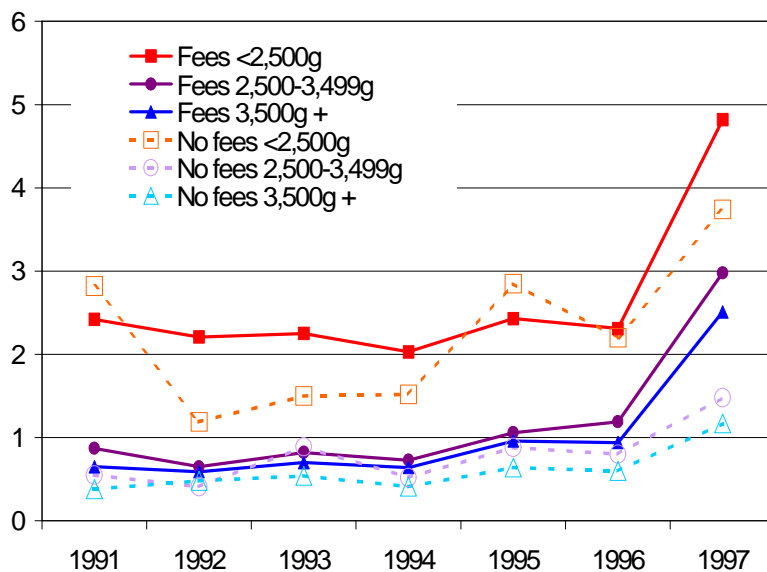


be postponed until the corrections are completed. The effect of these corrections is expected to reduce the number of pre-term births in the registered birth data file.

municipalities with no fees increased to about 5 percent in 1997, the proportion unregistered in municipalities with a fee was almost 10 percent. The proportion of unregistered births among mothers aged 25 and older was about 2 percent.

The effect of the registration fee was also examined by birth weight (Figure 10). It is clear that low birth weight births (infants weighing less than 2,500g at birth) are more likely to be unregistered at all times. The percentage of these births unregistered increased sharply in 1997. However, only 179 of the low birth weight unregistered births occurred in the non-fee charging

**Figure 10. Percentage of births unregistered by year, birth weight, and fee charging status.**



municipalities over the whole 7-year study period. Therefore these numbers are quite unstable, as is clear from the graph. In the other birth weight categories there also appears to be an effect of the fees. The percentage of births unregistered increased substantially in 1997 in the municipalities where fees were introduced. This increase was greater than that in municipalities where there was no fee introduced.

## CONCLUSION

The percentage of Ontario births unregistered in the vital statistics files has increased from less than 1 percent prior to 1995, to 3 percent in 1998. These unregistered births are not evenly distributed across the province. Some urban municipalities have a much higher proportion of unregistered births than others. The proportion of births unregistered also varies by maternal age and birth weight with younger mothers and lower birth weight babies being associated with a lesser



likelihood of registration. Changes in the distributions of maternal age and birth weight from 1991-1997 do not appear to account for the large increases in unregistered births witnessed in 1997.

The introduction of birth registration fees by some municipalities in mid-1996 and 1997 also was found to be associated with birth registration. Over two-thirds of births in 1997 were to residents of a municipality that charged a fee and these fees appear to have negatively affected the registration process. It should be noted however, that:

- (a) an increase in unregistered births did occur in non-fee charging municipalities, although to a lesser degree than in the municipalities where a fee was introduced, and
- (b) before the introduction of the fees, the proportion of births unregistered was slightly higher in the municipalities where a fee has been introduced.

Registration fees appear to have had a differential effect on different types of births. Most importantly, the proportion of births registered to teenage mothers is considerably lower in those municipalities where fees have been introduced. In these municipalities, almost 10% of births to teen mothers are unregistered. As well, low birth weight, short gestation, and multiple births were found to be associated with reduced registration.

The potential impact and implications of these results are many and require further investigation. Reduced birth and fertility rates for Ontario and its municipalities will impact on population projections. Reduced registrations to teen mothers will negatively affect teen pregnancy rates, which in turn has program planning implications. Similar scenarios apply to birth weight and pre-term birth statistics. The interaction of these factors and how they are distributed within municipalities was not addressed here and requires further investigation.

## REFERENCES

Ennis, S.L., Woodward, G.L., and Ardal, S. 2000. Low Birth Weight: Troubling Trend or Misguided Measure (Extended Mix). Central East Health Information Partnership.

Joseph, K.S. and Kramer, S.M. 1997. Recent trends in infant mortality rates and proportions of low-birth-weight live births in Canada. *Can Med Assoc J*, 157(5):553-41.

Statistics Canada. 1999. Postal Code Conversion File. May 1999 Postal Codes. Reference Guide. Ministry of Industry, Ottawa, Canada.

Woodward, G.L. and Ardal, S. 2000. Data Quality Report: Effect of Residence Code Errors on Fertility Rates. Central East Health Information Partnership.

## **APPENDIX 1.**

Survey form faxed to Ontario Municipal Clerks to determine registration fee status.

**APPENDIX 1. Survey form faxed to Ontario Municipal Clerks to determine registration fee status.**

Provincial Legislation enacted in 1996 allows Ontario municipalities to charge a fee to process **birth registration forms**. In collaboration with the **Ontario Office of the Registrar General** and the **Ontario Ministry of Health**, the Central East Health Information Partnership is investigating the effect, if any, that these fees might be having on birth registration. Birth events that go unregistered due to parents not submitting their Statement of Live Birth can significantly impact Ontario population estimates.

Please complete the questions below and return via FAX (**905-895-0848**) by February 25<sup>th</sup>, 2000.

Municipality Name: \_\_\_\_\_

Municipal Office Address: \_\_\_\_\_

Phone Number: \_\_\_\_\_

Does your municipality charge a fee to process birth registration forms (Notice of Live Birth, Statement of Live Birth)? Please check yes or no.

NO \_\_\_\_\_ YES \_\_\_\_\_

If yes, when did the fee come into effect and how much is the fee?

Date Fee Came Into Effect: \_\_\_\_\_

Amount of Fee: \_\_\_\_\_

Thank you for taking the time to complete this form. If you have any questions, please do not hesitate to contact Graham Woodward, (905) 830-4444 ext. 1210.

Sincerely,

Sten Ardal  
Director

**APPENDIX 2.**

**Number of live births and percentage of live births unregistered  
by urban municipality and year.**

**APPENDIX 2. Number of live births and percentage of live births unregistered by urban<sup>c</sup> municipality and year.**

**Urban Municipality** based of the residential postal code; only municipalities in where at least one birth was reported over the years 1991 through 1997 are included.

**Missing** = the percentage of all births in the given year that were not registered in the ORG files

**N** = total number of births (registered + non-registered) in the given year; “-“ indicates fewer than 5 births occurred.

**Colour** = birth registration fee status: **red = fees charged**; **green = no fees charged**; black = no information on fees

URBAN MUNICIPALITY	Total Births 1991-1997		1991		1992		1993		1994		1995		1996		1997	
	All	percent	percent missing	Births	percent missing	All Bi	percent missing	Births	percent missing	All Births	percent missing	All	percent missing	Births	percent missing	All Births
Ajax	7,584	0.75	0.31 (971)	0.58 (1,208)	0.75 (1,196)	0.89 (1,124)	1.02 (1,083)	0.88 (1,026)	0.82 (968)							
Amherstburg	914	0.44	0.00 (120)	0.00	1.46 (137)	(134)	0.00	0.00 (131)	0.00 (130)							
Ancaster		0.27	0.00	0.00 (189)	(155)	0.00	0.00 (150)	(170)	0.72							
Arnprior	505		0.00 (66)	(71)	1.22	3.80 (79)	(83)	1.59	4.92 (58)							
	3,421	0.50	(396)	0.20	0.20 (490)	(523)	0.77	0.42 (481)	1.56							
Aylmer	676		0.00 (82)	0.00 (105)	0.00 (100)	0.90 (111)	0.00 (100)	1.02 (98)	0.00 (80)							
Barrie	7,826	0.64	0.47 (844)	0.59 (1,189)	0.34 (1,162)	0.50 (1,195)	0.25 (1,191)	0.69 (1,157)	1.65 (1,070)							
Belleville	3,039	1.28	1.37 (366)	0.39 (512)	1.88 (478)	0.24 (423)	1.67 (480)	0.25 (403)	3.45 (364)							
Bracebridge	536	0.75	0.00 (67)	1.18 (85)	0.00 (77)	1.15 (87)	1.27 (79)	1.33 (75)	0.00 (66)							
Bradford West Gwillimbury	1,549	0.26	0.00 (199)	0.87 (230)	0.00 (219)	0.00 (223)	0.00 (242)	0.00 (228)	0.96 (206)							
Brampton	28,143	1.32	0.62 (3,244)	0.54 (3,904)	0.79 (4,070)	0.83 (4,083)	1.01 (4,354)	1.14 (4,393)	4.18 (3,924)							
Brantford	7,392	0.54	0.31 (971)	0.36 (1,100)	0.74 (1,086)	0.36 (1,101)	0.72 (1,109)	0.37 (1,069)	0.94 (947)							
Brockville	1,601	1.12	0.47 (211)	0.35 (287)	1.21 (247)	0.43 (235)	2.16 (231)	1.06 (188)	2.48 (197)							
Burlington	11,015	0.50	0.07 (1,357)	1.45 (1,654)	0.00 (1,666)	0.18 (1,646)	0.62 (1,619)	0.32 (1,570)	0.80 (1,491)							
Cambridge	9,219	0.55	0.45 (1,104)	0.29 (1,392)	0.22 (1,384)	0.51 (1,383)	1.38 (1,377)	0.50 (1,389)	0.50 (1,184)							
Carleton Place	782	1.66	1.82 (110)	0.73 (137)	1.92 (104)	2.75 (109)	0.00 (109)	1.85 (108)	2.86 (102)							
Chatham	3,604	1.53	0.00 (476)	0.70 (571)	0.76 (525)	1.81 (497)	2.10 (523)	1.66 (543)	3.84 (469)							
Clarington	4,989	0.44	0.39 (516)	0.60 (663)	0.27 (740)	0.27 (750)	0.76 (786)	0.13 (787)	0.67 (747)							
Cobourg	1,267	1.10	0.00 (175)	0.94 (212)	1.63 (184)	2.12 (189)	0.54 (186)	1.20 (166)	1.29 (155)							
Collingwood	983	2.54	2.44 (123)	2.58 (155)	2.61 (153)	2.82 (142)	1.42 (141)	2.14 (140)	3.88 (129)							
Cornwall	3,731	1.26	0.24 (419)	0.48 (620)	1.63 (612)	0.85 (589)	0.72 (554)	1.41 (495)	3.85 (442)							
Cumberland	3,715	0.86	0.20 (511)	0.56 (537)	0.37 (534)	0.88 (569)	1.80 (555)	0.57 (525)	1.65 (484)							
Douro	57	0.00														
Dryden	424	0.24	1.72 (58)	0.00 (62)	0.00 (68)	0.00 (54)	0.00 (75)	0.00 (57)	0.00 (50)							
Dundas	1,598	0.44	0.50 (201)	0.00 (240)	1.41 (213)	0.43 (233)	0.47 (211)	0.00 (246)	0.39 (254)							
East York	10,256	0.98	1.23 (1,136)	0.41 (1,456)	0.42 (1,444)	0.46 (1,528)	0.31 (1,612)	0.69 (1,597)	3.44 (1,483)							
Elliot Lake	895	1.90	0.67 (149)	3.40 (147)	1.52 (132)	1.41 (142)	3.20 (125)	0.00 (99)	2.97 (101)							
Ernestown	477	1.68	0.00 (52)	0.00 (74)	1.39 (72)	1.39 (72)	0.00 (78)	3.03 (66)	6.35 (63)							
Espanola	169	3.55	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (16)	3.08 (65)	2.38 (42)	6.52 (46)							

<sup>c</sup> Please note this table contains only municipalities characterized as urban using residential postal code. Please see the Methods for more details.

Essex	568	0.18	0.00 (68)	0.00 (75)	1.11 (90)	0.00 (93)	0.00 (81)	0.00 (84)	0.00 (77)
MUNICIPALITY	Total Births 1991-1997		1991	1992	1993	1994	1995	1996	1997
	N	% missing	percent N missing	percent N missing	percent N missing	percent N missing	percent N missing	percent N missing	percent N missing
Etobicoke	28,904	1.08	0.58 (3,424)	0.85 (4,129)	0.38 (4,235)	0.70 (4,281)	0.93 (4,431)	1.05 (4,289)	3.06 (4,115)
Fergus	907	0.77	0.00 (116)	0.78 (128)	0.00 (128)	1.52 (132)	1.97 (152)	0.00 (134)	0.85 (117)
Fort Erie	1,135	1.23	0.61 (164)	0.58 (171)	0.00 (149)	0.00 (177)	1.64 (183)	4.90 (143)	1.35 (148)
Fort Frances	680	0.88	2.35 (85)	0.00 (124)	0.00 (108)	0.00 (107)	0.00 (77)	2.30 (87)	2.17 (92)
Gananoque	393	2.54	0.00 (48)	0.00 (54)	1.64 (61)	0.00 (63)	1.64 (61)	6.06 (66)	10.00 (40)
Georgina	2,297	0.65	1.10 (273)	0.58 (346)	0.00 (370)	0.28 (354)	0.00 (358)	0.00 (326)	3.33 (270)
Gloucester	8,181	1.66	1.49 (1,209)	0.63 (1,261)	0.88 (1,243)	1.31 (1,146)	1.49 (1,138)	2.52 (1,113)	3.64 (1,071)
Goderich	494	0.81	0.00 (74)	0.00 (73)	1.59 (63)	5.26 (57)	0.00 (73)	0.00 (75)	0.00 (79)
Grimsby	1,362	0.37	0.54 (184)	0.00 (204)	0.00 (239)	1.11 (180)	0.00 (198)	0.61 (165)	0.52 (192)
Guelph	8,340	0.65	0.21 (967)	0.08 (1,207)	0.17 (1,181)	0.24 (1,238)	0.80 (1,250)	0.95 (1,260)	1.94 (1,237)
Halton Hills	3,249	0.58	1.22 (327)	0.48 (419)	0.60 (499)	0.00 (493)	0.20 (493)	0.77 (518)	1.00 (500)
Hamilton	28,761	0.76	0.33 (3,643)	0.37 (4,366)	0.54 (4,273)	0.78 (4,383)	1.19 (4,205)	0.68 (4,091)	1.45 (3,800)
Hanover	488	0.00	0.00 (65)	0.00 (67)	0.00 (73)	0.00 (64)	0.00 (71)	0.00 (77)	0.00 (71)
Hawkesbury	710	0.42	1.80 (111)	0.00 (121)	0.00 (102)	0.00 (100)	0.00 (100)	1.19 (84)	0.00 (92)
Ingersoll	916	0.76	1.08 (93)	0.00 (123)	2.01 (149)	0.00 (122)	0.59 (170)	0.74 (135)	0.81 (124)
Kanata	4,582	0.76	0.72 (558)	0.44 (677)	0.16 (627)	0.44 (681)	1.45 (692)	0.29 (696)	1.84 (651)
Kapuskasing	620	0.16	0.00 (73)	1.09 (92)	0.00 (88)	0.00 (94)	0.00 (105)	0.00 (80)	0.00 (88)
Kenora	760	0.53	0.00 (93)	0.00 (110)	0.00 (119)	0.00 (117)	0.94 (106)	0.90 (111)	1.92 (104)
Kincardine	492	0.00	0.00 (74)	0.00 (80)	0.00 (66)	0.00 (84)	0.00 (66)	0.00 (71)	0.00 (51)
Kingston	7,003	2.40	0.64 (784)	0.81 (1,109)	0.95 (1,058)	0.74 (1,077)	1.97 (1,064)	3.85 (1,014)	8.47 (897)
Kingsville	425	0.94	1.61 (62)	0.00 (60)	0.00 (73)	0.00 (49)	1.39 (72)	0.00 (57)	3.85 (52)
Kirkland Lake	763	0.66	0.88 (114)	0.00 (129)	1.90 (105)	0.00 (106)	0.00 (110)	0.00 (103)	2.08 (96)
Kitchener	16,544	0.57	0.50 (1,996)	0.37 (2,415)	0.77 (2,463)	0.24 (2,500)	0.56 (2,498)	0.73 (2,467)	0.82 (2,205)
LaSalle	1,615	0.00	0.00 (159)	0.00 (215)	0.00 (225)	0.00 (269)	0.00 (270)	0.00 (247)	0.00 (230)
Leamington	1,421	0.84	0.63 (160)	1.26 (159)	0.49 (206)	0.00 (217)	1.87 (214)	1.63 (245)	0.00 (220)
Lindsay	1,399	1.14	1.15 (174)	0.95 (211)	0.95 (211)	0.00 (204)	3.32 (211)	0.94 (213)	0.57 (175)
Listowel	439	0.91	2.78 (72)	0.00 (84)	0.00 (58)	3.08 (65)	0.00 (58)	0.00 (55)	0.00 (47)
London	28,108	1.56	1.19 (3,459)	0.46 (4,322)	3.56 (4,360)	1.11 (4,249)	1.42 (4,159)	1.56 (3,854)	1.51 (3,705)
Markham	12,327	0.74	1.03 (1,552)	0.65 (1,843)	0.70 (1,849)	0.39 (1,785)	0.84 (1,794)	0.56 (1,782)	1.05 (1,722)
Meaford	197	0.51	0.00 (-)	0.00 (-)	0.00 (19)	0.00 (41)	0.00 (49)	2.04 (49)	0.00 (36)
Midland	1,252	0.48	0.65 (153)	1.04 (192)	0.00 (220)	0.56 (179)	0.00 (180)	0.00 (152)	1.14 (176)
Milton	1,887	0.37	0.00 (254)	0.00 (303)	0.37 (268)	0.00 (283)	0.73 (274)	0.77 (259)	0.81 (246)
Mississauga	54,513	0.83	0.44 (6,109)	0.53 (7,704)	0.37 (8,026)	0.51 (8,272)	0.76 (8,435)	0.74 (8,141)	2.44 (7,826)
Napanee	436	1.83	0.00 (56)	1.22 (82)	0.00 (67)	1.41 (71)	6.35 (63)	0.00 (47)	4.00 (50)
Nepean	10,026	1.06	1.08 (1,301)	0.46 (1,509)	1.03 (1,454)	0.69 (1,459)	1.07 (1,498)	1.21 (1,403)	1.93 (1,402)
Newmarket	5,591	0.48	0.16 (609)	0.00 (810)	0.12 (809)	0.36 (831)	0.58 (859)	0.72 (837)	1.32 (836)
Niagara Falls	5,822	0.98	0.26 (764)	0.11 (886)	1.64 (856)	0.36 (829)	1.28 (857)	1.26 (876)	1.99 (754)
North Bay	4,019	2.84	2.08 (528)	1.26 (636)	3.03 (627)	0.65 (616)	3.63 (579)	3.87 (542)	6.11 (491)
North York	51,219	1.04	1.01 (5,947)	0.78 (7,308)	0.58 (7,648)	0.64 (7,666)	0.70 (7,957)	0.98 (7,477)	2.67 (7,216)

MUNICIPALITY	Total Births 1991-1997		1991		1992		1993		1994		1995		1996		1997	
	N	% missing	percent missing	N	percent missing	N	percent missing	N	percent missing	N	percent missing	N	percent missing	N	percent missing	N
Oakville	10,855	0.66	0.38 (1,312)		0.56 (1,604)		0.37 (1,641)		0.43 (1,610)		0.82 (1,591)		1.02 (1,572)		1.05 (1,525)	
Orangeville	2,345	0.68	0.69 (289)		0.93 (321)		0.27 (368)		0.29 (346)		1.10 (365)		0.56 (360)		1.01 (296)	
Orillia	2,189	0.96	0.39 (255)		0.31 (321)		0.31 (326)		1.16 (344)		2.38 (336)		1.23 (325)		0.71 (282)	
Oshawa	12,703	0.77	0.75 (1,606)		0.35 (2,007)		0.66 (1,976)		0.54 (1,858)		1.01 (1,883)		1.02 (1,767)		1.18 (1,606)	
Ottawa	25,257	2.04	1.62 (3,387)		0.98 (3,686)		1.46 (3,823)		1.66 (3,678)		1.93 (3,773)		2.42 (3,469)		4.33 (3,441)	
Owen Sound	1,672	0.24	0.00 (222)		0.00 (270)		0.39 (259)		0.00 (240)		0.85 (236)		0.00 (207)		0.42 (238)	
Paris	794	0.25	0.00 (102)		0.00 (125)		0.86 (116)		0.00 (124)		0.00 (113)		0.00 (113)		0.99 (101)	
Parry Sound	455	0.66	1.69 (59)		0.00 (63)		1.69 (59)		1.35 (74)		0.00 (72)		0.00 (72)		0.00 (56)	
Pembroke	1,178	1.19	0.67 (150)		0.57 (175)		1.74 (172)		0.00 (187)		2.89 (173)		1.76 (170)		0.66 (151)	
Perth	480	0.63	0.00 (63)		0.00 (78)		1.12 (89)		1.45 (69)		0.00 (63)		0.00 (62)		1.79 (56)	
Petawawa	1,813	0.66	0.52 (193)		0.72 (279)		0.75 (265)		0.97 (308)		0.41 (244)		0.00 (272)		1.19 (252)	
Peterborough	5,241	0.78	0.31 (637)		0.12 (866)		0.39 (779)		0.50 (805)		1.09 (733)		0.41 (737)		2.92 (684)	
Pickering	7,282	1.14	0.65 (918)		1.06 (1,136)		1.00 (1,004)		0.95 (1,056)		0.56 (1,069)		0.67 (1,048)		3.04 (1,051)	
Pittsburgh	707	1.70	0.00 (85)		0.00 (125)		0.00 (108)		0.00 (112)		4.30 (93)		4.08 (98)		4.65 (86)	
Point Edward	149	1.34	3.57 (28)		0.00 (24)		0.00 (25)		0.00 (15)		0.00 (23)		0.00 (21)		7.69 (13)	
Port Colborne	1,070	1.12	0.73 (137)		0.00 (152)		0.65 (155)		1.84 (163)		1.19 (168)		2.00 (150)		1.38 (145)	
Port Hope	1,011	0.40	0.00 (158)		0.00 (155)		0.61 (165)		0.65 (155)		0.75 (134)		0.00 (121)		0.81 (123)	
Port Stanley	105	0.00	0.00 (-)		0.00 (-)		0.00 (20)		0.00 (20)		0.00 (20)		0.00 (20)		0.00 (22)	
Renfrew	521	0.19	1.28 (78)		0.00 (88)		0.00 (72)		0.00 (74)		0.00 (76)		0.00 (59)		0.00 (74)	
Richmond Hill	9,000	0.78	0.29 (1,048)		0.23 (1,314)		0.15 (1,344)		0.51 (1,382)		1.23 (1,381)		0.54 (1,290)		2.50 (1,241)	
Rockcliffe Park	98	1.02	4.55 (22)		0.00 (18)		0.00 (10)		0.00 (10)		0.00 (12)		0.00 (13)		0.00 (13)	
Rockland	664	1.66	2.02 (99)		1.32 (76)		1.75 (114)		0.91 (110)		0.00 (95)		1.04 (96)		5.41 (74)	
Sarnia	5,150	1.03	0.72 (695)		0.47 (848)		0.52 (773)		0.96 (729)		0.26 (773)		0.73 (688)		4.04 (644)	
Sault Ste. Marie	5,579	0.97	0.71 (705)		1.05 (860)		1.36 (881)		0.87 (805)		0.46 (863)		1.07 (746)		1.25 (719)	
Scarborough	52,628	1.20	1.11 (6,374)		0.91 (7,573)		0.86 (7,709)		0.77 (7,889)		1.17 (8,089)		0.76 (7,745)		2.91 (7,249)	
Simcoe	982	0.51	0.00 (133)		0.00 (143)		0.00 (146)		1.28 (156)		0.67 (150)		0.74 (136)		0.85 (118)	
Smiths Falls	814	2.21	1.39 (144)		0.84 (119)		3.31 (121)		0.88 (114)		3.28 (122)		1.10 (91)		4.85 (103)	
St. Catharines	10,240	1.15	0.53 (1,332)		0.51 (1,582)		1.71 (1,521)		0.94 (1,488)		1.37 (1,530)		1.17 (1,455)		1.88 (1,332)	
St. Clair Beach	196	0.51	0.00 (18)		0.00 (37)		0.00 (29)		0.00 (32)		0.00 (29)		3.23 (31)		0.00 (20)	
St. Thomas	2,819	0.50	0.00 (337)		0.00 (426)		0.98 (407)		0.48 (413)		1.36 (440)		0.48 (420)		0.00 (376)	
Stoney Creek	4,027	0.50	0.22 (461)		0.56 (537)		0.47 (636)		0.67 (597)		0.64 (623)		0.35 (571)		0.50 (602)	
Stratford	2,379	1.13	0.65 (307)		0.30 (334)		0.56 (358)		1.17 (343)		0.52 (384)		1.43 (349)		3.62 (304)	
Strathroy	1,096	1.28	0.78 (128)		0.00 (165)		2.84 (176)		0.61 (163)		1.27 (157)		0.60 (168)		2.88 (139)	
Sudbury	6,470	4.00	3.16 (790)		1.74 (1,033)		2.87 (942)		3.03 (1,023)		6.22 (932)		3.85 (883)		7.61 (867)	
Tecumseh	999	0.30	0.00 (107)		0.00 (131)		0.00 (157)		0.62 (161)		0.00 (180)		0.00 (141)		1.64 (122)	
Thorold	1,277	1.17	1.11 (180)		0.52 (191)		1.54 (195)		0.48 (208)		2.03 (197)		1.23 (163)		1.40 (143)	
Thunder Bay	8,337	0.46	0.18 (1,096)		0.38 (1,329)		0.47 (1,268)		0.50 (1,210)		0.56 (1,247)		0.34 (1,182)		0.80 (1,005)	
Tillsonburg	928	1.19	0.00 (93)		0.00 (145)		0.83 (121)		1.41 (142)		1.37 (146)		2.60 (154)		1.57 (127)	
Timmins	2,610	4.21	2.53 (316)		1.99 (453)		2.10 (381)		1.96 (357)		1.52 (396)		6.25 (352)		14.08 (355)	



MUNICIPALITY	Total Births 1991-1997		1991	1992	1993	1994	1995	1996	1997
	N	% missing	percent N missing	percent N missing	percent N missing	percent N missing	percent N missing	percent N missing	percent N missing
Toronto	54,983	1.36	1.08 (6,550)	0.80 (8,104)	0.85 (7,994)	0.74 (8,206)	1.16 (8,358)	1.38 (8,037)	3.57 (7,734)
Trenton	1,515	1.45	1.06 (189)	0.92 (217)	1.53 (261)	1.71 (234)	1.44 (209)	1.46 (206)	2.01 (199)
Valley East	1,316	3.19	50.00 (-)	1.89 (53)	3.32 (271)	1.54 (259)	4.69 (256)	1.95 (256)	4.57 (219)
Vanier	1,603	4.43	3.38 (237)	2.10 (238)	2.58 (271)	3.52 (256)	5.44 (239)	3.26 (184)	12.92 (178)
Vaughan	11,430	0.74	0.48 (1,447)	0.54 (1,662)	0.06 (1,586)	0.25 (1,606)	0.60 (1,660)	1.08 (1,659)	1.99 (1,810)
Wallaceburg	993	1.71	0.79 (126)	0.00 (142)	1.49 (134)	1.34 (149)	0.66 (151)	4.20 (143)	3.38 (148)
Waterloo	6,520	0.40	0.26 (773)	0.21 (968)	0.41 (985)	0.11 (931)	0.51 (971)	0.41 (978)	0.88 (914)
Welland	3,663	0.33	0.20 (496)	0.00 (567)	0.00 (531)	0.53 (566)	0.70 (573)	0.39 (513)	0.48 (417)
Whitby	6,543	0.67	0.73 (824)	0.33 (922)	0.68 (1,026)	0.85 (946)	0.50 (1,006)	0.65 (925)	1.01 (894)
Whitchurch- Stouffville	1,404	0.85	1.09 (183)	0.96 (209)	0.96 (208)	0.00 (208)	0.00 (209)	1.04 (193)	2.06 (194)
Windsor	16,608	0.31	0.27 (1,831)	0.25 (2,433)	0.33 (2,461)	0.16 (2,435)	0.11 (2,614)	0.16 (2,463)	0.89 (2,371)
Woodstock	2,740	0.73	0.00 (345)	0.00 (410)	2.03 (395)	0.46 (439)	1.54 (390)	0.51 (396)	0.55 (365)
York	15,245	1.67	0.84 (1,788)	0.97 (2,173)	0.83 (2,286)	0.88 (2,278)	1.58 (2,346)	1.86 (2,308)	4.84 (2,066)
<b>TOTAL</b>	725,142	1.07	0.77 88,846	0.62 108,114	0.84 108,926	0.71 109,220	1.06 110,902	1.06 106,319	2.51 100,683