Under-reporting of Live Births in Ontario: 1991-1997

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ABSTRACT

Objective: To examine unregistered births in Ontario and consider related factors, including adoption of administrative fees for birth registration.

Methods: Documents from both the parents and the attending physician are required for births to be entered into Ontario's live birth database. Our study used data from the Ontario Registrar General to look at the prevalence and characteristics of unregistered births, and a survey of municipal clerks to identify municipalities charging fees for parental documentation.

Results: The percentage of births going unrecorded increased threefold from 1991 to 1997. The odds of an unregistered birth were higher for teenage mothers, low birthweight babies, and mothers residing in a municipality that charged birth registration fees.

Conclusion: The introduction of registration fees by some municipalities appears to account for an increase in unregistered births. It is recommended that the Ontario Registrar General work to remove financial and administrative barriers that compromise birth statistics.

La traduction du résumé se trouve à la fin de l'article.

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Concern about the quality of Ontario birth statistics has been noted in provincial comparisons using national statistics.¹ While some coding problems have been identified,^{2,3} the completeness of Ontario birth reporting has not been previously documented.

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 annual birth 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). Each year, an electronic file of registered births is compiled that includes births for which both forms were received. This file is forwarded to Statistics Canada who subsequently distributes it to the Ontario Ministry of Health and Long-Term Care (MOHLTC). If the ORG only receives one of the two required forms, that birth is not included in the electronic file, and does not contribute to Ontario's vital statistics data.

If large numbers of births are unregistered, and/or if these unregistered births are not randomly distributed across the province, then some local health agencies may not be receiving accurate information about pregnancy, birth and fertility rates. Similarly, public health programs could be impacted if the characteristics of unregistered births and the mothers (e.g., maternal age, infant birthweight, etc.) are different from those of registered births.

Changes to Ontario law in 1996 allowed municipalities to introduce an administrative fee for birth registrations. Where implemented, this fee ranges from \$10 to \$27.50, and may discourage some 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. Furthermore, failures to register could disproportionately affect certain populations.

The purpose of this paper is to examine the prevalence of unregistered births over time and to examine factors related to unregistered births, including adoption of administrative fees for birth registration. For this report, an **unregistered birth** is

defined as a birth event that is excluded from the official Ontario vital statistics data distributed by Statistics Canada and the Ontario MOHLTC because one of the two required forms is missing.

METHODS

In 1999, the Central East Health Information Partnership (CEHIP) 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 be paid to enter the unregistered birth documentation into an electronic data file and forward this file to CEHIP for analysis.

For the purposes of this project, the ORG prepared a database containing the information on births between 1991 and 1997 for which they had received only the Physician's Notification of Birth. 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.

A survey of Ontario's municipal clerks was conducted to identify municipalities charging fees for birth registration. The Association of Municipalities of Ontario, on behalf of the Central East Health Information Partnership, faxed this survey to all Ontario clerks' offices in February 2000. CEHIP followed up by telephone to ensure participation of all larger Ontario municipalities, confirming fee status for 91.2% of all Ontario births in 1997.

Place of residence was 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 associated with these codes.³ These codes were used to assign residence to the registered and unregistered records in a consistent and reliable fashion. Since some codes could not be assigned, the absolute number of births reported here will not match with the official numbers reported by the ORG and Statistics Canada. Records with incomplete and invalid postal codes were excluded from all analyses, resulting in the loss of approxi-

TABLE 1

Association of Unregistered Births with Urban Residence, Mother's Age, Birthweight, and Birth Registration Fees

Independent Variable* (n=672,107)	Unadjusted		Adjusted	
	Unregistered Birth (yes/no) OR	95% CI	Unregistered Birth (yes/no) OR	95% CI
Mother's Age in Years				
0 = 25 or more	1		1	
1 = 20-24	2.17	2.05-2.29	2.26	2.14-2.39
2 = 19 or less	3.70	3.44-3.97	3.89	3.62-4.18
Low Birthweight				
0 = No	1		1	
1 = Yes	2.60	2.42-2.79	2.45	2.28-2.63
Municipality Charges Fees				
0 = No	1		1	
1 = Yes	1.54	1.45-1.64	1.63	1.53-1.74
Year of Birth				
0 = 1991-1996	1		1	
1 = 1997	3.09	2.94-3.25	3.16	3.01-3.33

* All variables were found to have significant Odds Ratios at the $p < 0.05$ level.

OR = Odds Ratio

95% CI = 95% Confidence Interval

Figure 1. Percentage of births unregistered, 1991-1997, urban residence versus rural

mately 7% of all records from 1991 to 1997, but less than 4% in the 1994-1997 period.

Rural residences were identified using two methods: 1) a Delivery Mode Type in the Postal Code Conversion File⁴ of either *rural* or *post box*; or 2) a "0" as the second character of the postal code. Mother's municipality of residence was assigned using the Single Link Indicator* of the Postal Code Conversion File.⁴ Urban

postal codes were assigned to a Census Sub-Division (CSD), which corresponds well with urban municipalities. Rural records were excluded from the subsequent analyses, because conversion of rural postal codes into a CSD is much less accurate. In a number of CSDs the majority of the postal codes were classified as rural, but a few postal codes were classified as urban. An urban CSD was assigned if (1) 100% of the postal codes within it were classified

* 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 Census Division (CD), the postal code assigned to that enumeration area also becomes assigned to the associated CD and CSD.

Figure 2. Percentage of urban births unregistered by birth registration fee charging status of municipality of residence, 1991-1997

Figure 3. Percentage of urban births unregistered by mother's age, 1991-1997

as urban or (2) the CSD contained 5 or more urban postal codes and at least 50% of the postal codes within it were classified as urban.

Analyses focused on relating unregistered births with five variables of significant interest to public health: residence type (urban versus rural), mother's age, birthweight, introduction of a birth registration fee, and year of birth. Gestational age was omitted from the analyses due to data quality concerns.³ 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.² Analyses of residence type included all records with a valid postal code. However, analyses of all other variables were carried out using urban residence records with complete data for mother's age, birthweight, registration fee and year of birth.

The association of each selected variable with registration status was charted over time and univariate logistic regression was run to assess the degree of association of each independent variable with unregistered birth events for all years combined (1991-1997). Based on initial findings, year of birth was assessed using a binary

year variable that compared births in 1991-1996 with births in 1997. Multivariate, backward, stepwise regression was then run to determine which variables were most associated with unregistered births. Independent variables were removed one at a time from the multivariate model if their probability was equal to or greater than 0.05, starting with the least significant variable, until only significant variables were left in the model. Because this analysis included only urban births, this variable was not included in the model.

RESULTS

A total of 927,152 birth records from 1991 through 1997 with valid Ontario residential postal codes, birthweights of at least 500g, and gestational ages of 20 weeks or greater were analyzed. Of these, 9,629 (1.04%) were unregistered by the ORG. Comparison to the original data set, with missing or invalid postal codes included, show that 1.07% were unregistered overall.

Figure 1 shows that the percentage of all live births that were unregistered was quite stable between 1991 and 1996 (0.6% - 1.0%). In 1997 the number of unregistered births more than doubled to almost 3,000 (2.3%) and the odds of an urban birth being unregistered were 3 times greater than in previous years (Table I).

There were far fewer births to mothers residing in rural areas (182,269) compared to urban areas (744,883), but both had a similar proportion of unregistered births from 1991 to 1996. Although unregistered births increased in urban and rural areas in 1997, the largest increase was associated with urban residents (Figure 1). For all years combined, the odds of an unregistered birth were only slightly higher in an urban area (OR=1.18, CI=1.12-1.25).

The municipal survey identified the presence or absence of registration fees for more than 90% of our urban resident births. Mother's age and birthweight information were available for almost all of these records, resulting in 672,107 births available for further analyses.

Over 75% of urban births were to residents living in an area that introduced a registration fee. Historically, these areas tended to have a relatively higher proportion of unregistered births. However, once fees were introduced, unregistered births

were twice as common in these municipalities (Figure 2).

Unregistered urban births were found to vary by mother's age and the baby's weight. Teen mothers living in urban areas were most likely to have an unregistered birth (Table I), with the proportion of unregistered births rising sharply in 1997 from about 2.5% to over 8% (Figure 3). Although births to mothers aged 25-34 saw the smallest increase in 1997, this represents a substantial increase in the absolute number of births from 631 in 1996 to 1,427 in 1997. The odds of a low birthweight baby being unregistered were about 2.5 times greater compared to a regular birthweight child (Table I), with both birthweight categories showing a marked increase in 1997 (Figure 4). Analysis of excluded records revealed similar patterns.

Multivariate logistics regression found all variables to be significantly associated with birth registration ($p < 0.05$), although the odds ratio for each variable differed slightly from those found during the unadjusted analysis (Table I). Further analysis of fee status and mother's age for urban residents revealed that almost 10% of births to teen mothers in 1997 went unregistered (Figure 5).

DISCUSSION

The percentage of Ontario births unregistered in the vital statistics files has increased from less than 1% prior to 1995, to 2.3% in 1997. Aggregate data for 1998 (personal communication, Paul Inkila, ORG) show a continued increase to approximately 3% of all births. Unregistered events were more likely with younger mothers and lower birthweight babies. Over three quarters of the urban resident births were to residents of a municipality that introduced a registration fee in mid-1996 or 1997 and these fees appear to have negatively affected the registration process. It should be noted however, that:

- 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
- before the introduction of the fees, the proportion of births unregistered was higher in the municipalities where a fee was subsequently introduced.

Figure 4. Percentage of urban births unregistered by birthweight, 1991-1997

Figure 5. Unregistered urban births in 1997 by mother's age and fee status

The first observation may result from an earlier closing date for the annual data file, which would reduce the opportunity to capture tardy submissions. The second finding indicates that failure to register a birth is influenced by factors other than just fees, suggesting the need for further investigation.

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. Reduced registrations to teen mothers will negative-

ly affect teen pregnancy rates, which in turn has planning implications. Unregistered events reduce Ontario's birth and fertility rates and will impact on population projections. Similar scenarios apply to birthweight and pre-term birth statistics. Short gestation and multiple births are related factors that have been reported elsewhere.⁶

This issue affects surveillance data, which is one reason why the Canadian Perinatal Surveillance System (Health Canada) has excluded Ontario from many of its publications. Ontario municipalities continue to charge fees for birth registration, unwittingly compromising the accuracy of the information they rely on for

planning. It is therefore recommended that the Ontario Registrar General work to remove financial and administrative barriers to comprehensive birth registration.

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RÉSUMÉ

Objectif : Examiner les naissances non enregistrées en Ontario et étudier les facteurs connexes, dont la mise en place de frais administratifs pour l'enregistrement des naissances.

Méthode : On exige des documents des parents et du médecin traitant pour l'enregistrement d'une naissance dans la base de données ontarienne des naissances d'enfants vivants. Nous avons utilisé les données du conservateur des actes de l'état civil de l'Ontario pour examiner la prévalence et les caractéristiques des naissances non enregistrées, et mené une enquête auprès des greffiers municipaux pour repérer les municipalités qui perçoivent des frais pour les documents parentaux.

Résultats : Le pourcentage des naissances que l'on n'enregistre pas a triplé entre 1991 et 1997. Les probabilités qu'une naissance ne soit pas enregistrée étaient plus élevées pour les mères adolescentes, les bébés ayant un poids insuffisant à la naissance et les mères vivant dans une municipalité qui percevait des frais pour l'enregistrement des naissances.

Conclusion : La mise en place de frais d'enregistrement dans certaines municipalités semble expliquer la hausse des naissances non enregistrées. Nous recommandons que le conservateur des actes de l'état civil de l'Ontario tente de supprimer les obstacles financiers et administratifs qui faussent les statistiques de natalité.