Being Born in Manitoba

A Look at Perinatal Health Issues

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ABSTRACT

Objective: The Manitoba Centre for Health Policy was commissioned by Manitoba's provincial health department to examine the health of newborns born 1994 through 1998, using three indicators: preterm birth (<37 weeks gestation), birthweight, and type of infant feeding.

Methods: Data were derived from the Population Health Research Data Repository and the National Longitudinal Survey of Children and Youth 1996. Variation by 12 Regional Health Authorities (RHAs) and by 12 Winnipeg Community Areas (CAs) was examined, as well as associations with the population's health and socioeconomic well-being.

Results: Manitoba's preterm birth rate was 6.7% of live births, from 5.3% to 7.4% by RHA, and 5.7% to 8.0% by Winnipeg CA. Manitoba's low birthweight rate (<2500 g) was 5.3%, from 2.7% to 5.7% by RHA, and 4.4% to 7.2% by Winnipeg CA. The lower the income, the greater the likelihood of low birthweight ($p < 0.05$). Manitoba's breastfeeding initiation rate was 78%, from 64% to 87% by RHA, and 66% to 90% by Winnipeg CA. The lower the income and the poorer the health status of the population, the lower the breastfeeding rate ($p < 0.001$). Of those initiating breastfeeding, 42% breastfed for at least six months.

Conclusion: Factors affecting child health in Manitoba could be addressed through systematic programs both during pregnancy and during the postpartum period, including support for nutritional counselling, promotion of breastfeeding, smoking cessation programs, and social policy decisions designed to overcome disparities within low-income groups and populations with poorer health status.

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

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The health of the youngest members of our society demands our attention as health planners and decision-makers. This paper was part of a provincially commissioned report on the health of children residing in the Canadian province of Manitoba, and focuses on three indicators associated with newborn health: gestational age, birthweight, and breastfeeding status. The relationship of each indicator with the health and socioeconomic well-being of the region's population in which the infant resides, is examined. It was hypothesized that these rates would be highly variable by geographical area, and would be associated with income and with the health and socioeconomic well-being of the community.

The World Health Organization considers the rate of low birthweight (less than 2500 grams) a key indicator when measuring progress towards attainment of overall population health.¹ Babies who are born preterm or at low birthweight are at greater risk of poor health outcomes and thus require more health care resources.² Lower than USA rates, Canadian rates for preterm and low birthweight were 7.1% and 5.9% respectively.³⁻⁵

High birthweight (greater than 4000 g) may also be a concern due to increased probability of birth complications, and possible increases in adult health problems such as obesity and diabetes.⁶ In 1997, the large-for-gestational-age rate (defined as the number of live births above the 90th percentile of birthweight for gestational age) in Canada was 10.7%.⁷

Breastfeeding is considered a key indicator of child health, due to the protection which breastfeeding affords in a dose-response relationship against such infant illnesses as gastrointestinal and respiratory infections⁸⁻¹⁴ even in smoking households,¹⁵ and the potential benefits of breastfeeding on cognitive development¹⁶⁻²¹ and on cost savings within the health care system.²²

The National Population Health Survey (NPHS) and the National Longitudinal Survey of Children and Youth (NLSCY) reported a Canadian breastfeeding initiation rate of 73% in 1996. The percentage of breastfed newborns who were breastfed longer than six months was 31% according to NPHS, and 23% according to NLSCY, slightly higher than reported USA six-month rates of 21.6%.²³⁻²⁵ Reasons for the discrepancy between the two Canadian surveys are discussed further in the Methods section.

METHODS

This is a cross-sectional study of infants less than one year old, residing in the province of Manitoba and born during the calendar years from January 1, 1994 through to December 31, 1998. Two data sources were used – a hospital discharge file available through the Manitoba Population Health Research Data Repository of the Manitoba Centre for Health Policy, and the 1996 National Longitudinal Survey of Children and Youth (NLSCY) to determine breastfeeding duration rates. Preterm babies were defined as having a gestational age less than 37 weeks, low birthweight was defined as a birthweight less than 2500 g, and high birthweight greater than 4000 g. Breastfeeding initiation rates were approximated using the hospital discharge abstracts, where feeding type of newborns is recorded upon discharge as either “breast,” “both breast or artificial,” or “artificial.” Grouping together “breast” and “both breast or artificial” to produce a summation percent of “any breastfeeding” is the most valid, since it has been noted anecdotally that different institutions use different amounts of supplement as the cut-off for coding “both” versus “only breastfed.” The percentage of missing feeding type data was 1.95% provincially, but much higher in a few rural RHAs with the largest at 15% for Interlake RHA. All indicators were analyzed by 12 geographical areas of Manitoba called “Regional Health Authorities” (RHAs), by 12 subregions of Winnipeg called “Winnipeg Community Areas” (Winnipeg CAs), and by income quintile (urban and rural). Refer to Brownell et al. for more information about the methodology.²⁶

The health status of a region's population is measured by the premature mortality rate (PMR) of the region, which is also correlated with a measure of socioeconomic well-being of the region, called the Socioeconomic Factor Index or SEFI. Each health indicator graph by region is ordered by PMR, from the regions with the lowest PMR at the top (that is, regions having populations with the best overall health status and socioeconomic well-being) to the regions with the highest PMR at the bottom (that is, regions having the poorest health status and socioeconomic well-being). Regional newborn health indicator rates were correlated with the regional PMR and SEFI, using Spearman rank correlations due

Figure 1. Preterm birth rates (less than 37 weeks) by RHA, 1994-98

to non-normal data (see Martens et al. for further explanation of PMR and SEFI²⁷).

For the breastfeeding duration data, information was derived from the 1996 NLSCY. The NLSCY was administered by Statistics Canada, using a multi-stage, cluster design to choose respondents. Analyses were done on master files containing anonymous information for individual respondents. Weighting variables were available to yield weighted estimates approximating the population rates, but since specialized bootstrapping programs were not available for NLSCY, valid statistical testing which adjusts for design effect was not possible. Therefore, confidence intervals may be somewhat underestimated in our analyses. NLSCY also excluded “on reserve” First Nations women from the survey, so breastfeeding rates for many of the northern RHAs may not reflect the entire region's population.

The NLSCY survey asked women whose infants were less than 2 years of age about the type of feedings and duration of any breastfeeding. In the published analyses of the survey, any infant who was still breastfeeding at the time of the survey was excluded from the calculation of breastfeeding duration.²³ This could create a bias to underestimating breastfeeding duration rates. This study calculated breastfeeding duration rates using statistical techniques to allow incorporation of data for babies still breastfeeding at the time of the survey, called “censored data” (that is, data where one knows information up to a certain point but not beyond).

Kaplan Meier Survival curves, and Cox's Proportional Hazards regression modelling, incorporate censored data.

RESULTS

Preterm birth

For the years 1994-1998 in Manitoba, the overall preterm birth rate (less than 37 weeks gestation) was 6.72%, or 67.2/1000 live births. Figure 1 shows preterm birth rates by RHAs. For preterm rates within the Winnipeg CAs, refer to the complete report available at www.umanitoba.ca/centres/mchp. Babies born to Winnipeg residents were more likely to be preterm, at 7.06% of all live births. The Downtown area of Winnipeg, the area of poorest population health status and highest socioeconomic risk, had the highest preterm birth rate in the province at 7.96%.

“At risk” birth rates: Low and high birthweight babies

The 1994-1998 Manitoba rate of “at risk” birthweights was 20.2%, with 5.3% low birthweight and 14.9% high birthweight. Figure 2 compares the percent of “at risk” births by RHA (the complete report available at www.umanitoba.ca/centres/mchp gives Winnipeg CA rates). For low birthweight in 1994-1998, both North (4.9%) and South Rural (4.8%) areas had lower rates than Manitoba at 5.3%, with Winnipeg RHA having a significantly high-

Statistical Significance:

* - Rate significantly different from Manitoba mean at $p < 0.05$

N - Rate significantly different from mean for Northern Manitoba at $p < 0.05$

S - Rate significantly different from mean for Rural South Manitoba at $p < 0.05$

Figure 2. "At Risk" (high/low) birthweight by RHA, 1994-98

R represents rural income quintiles, with R1 being the lowest and R5 being the highest income quintile; U represents urban income quintiles, with U1 being the lowest and U5 being the highest income quintile. Statistically significant trends in both rural and urban ($p < 0.05$), using two-tailed Cochran-Armitage trend test.

Figure 3. Low birthweight by rural and urban income quintile, 1994-98

er rate at 5.7%. Within Winnipeg, the area with the poorest population health status overall (Downtown) had the highest low birthweight rate in the province at 7.2%.

Low birthweight rates decreased as neighbourhood income increased ($p < 0.05$), both in the rural and urban regions of Manitoba (see Figure 3). Women in the lowest income group were 19% more likely (5.3% versus 4.4%) to

have a low birthweight baby in rural Manitoba, and 39% more likely (6.9% versus 4.9%) in urban Manitoba. The relative risk, as well as the absolute risk, was not as great in the rural areas of Manitoba, where women even in the lowest income group had low birthweight rates equivalent to the provincial average (5.3%).

High birthweight (greater than 4000 g) also shows geographical variation. Figure 2 illus-

trates the fact that both the North (18.4%) and South Rural (16.4%) regions had greater high birthweight rates than Manitoba (14.9%), and that Winnipeg had the lowest rate at 13.3%. All Winnipeg CAs had rates similar to or lower than the provincial average.

In rural Manitoba, the trend of high birthweight by income quintile was significant ($p < 0.001$) and consistent with those of low birth rates, with the women in the lowest income group 19% more likely (18.9% versus 15.9%) to have a high birthweight baby compared to the highest income quintile (see Figure 4). However, the trend was opposite in the urban areas ($p < 0.001$), with the greatest high birthweight rates in the highest income group (14.8% versus 12.1%).

Breastfeeding initiation rates

For the years 1994 through 1998, the Manitoba breastfeeding initiation rate was 78.4%, with the North substantially lower at 64.5%, South Rural slightly higher at 79.4%, and Winnipeg higher at 80.6% (see Figure 5). Outside of Winnipeg, South Eastman's initiation rate of 87.2% was the highest, followed by Churchill RHA at 87.0%. Data from a longitudinal study on breastfeeding in South Eastman verifies this. A 1997 prospective survey found a 91% initiation rate for the South Eastman RHA (Roberts J. South Eastman Breastfeeding Survey, 1997. Unpublished). For all the birth records in the five-year period ($n = 75,662$), 1.9% were missing feeding information on the hospital discharge record. Breastfeeding rates are based upon only those records with complete feeding information ($n = 74,191$). Four regions were missing information on a substantial number of newborn records: Interlake (15.0% missing); North Eastman (6.5% missing); Marquette (12.5% missing); and South Westman (7.7% missing).

Within Winnipeg, there were marked differences in breastfeeding initiation rates, with lower rates in areas of poor health status and high socioeconomic risk (the complete report available at www.umanitoba.ca/centres/mchp gives Winnipeg CA rates). The Winnipeg CA of Fort Garry had the highest initiation rate in the province, at 90%.

There was a significant trend ($p < 0.001$) in breastfeeding initiation by income quintile (see Figure 6). In both urban and rural areas, women in the highest income quintile were 30% more likely to breastfeed than women in the lowest income quintile – 90% versus 69% urban; 83% versus 61% rural.

Breastfeeding duration rates

Figure 7 shows the percent of Manitoba infants being breastfed at various postpartum time points (n=199). The bottom (x) axis indicates the age of the infant, and the side (y) axis shows the percentage of children breastfeeding at that age: 85% ($\pm 5\%$) of all Manitoba infants initiated breastfeeding, 57% ($\pm 7\%$) of all Manitoba infants were being breastfed at 3 months postpartum in 1996, 36% ($\pm 7\%$) at 6 months and 15% ($\pm 6\%$) at 12 months postpartum. Comparison data from South Eastman RHA's prospective study in 1997 (Roberts J. South Eastman Breastfeeding Survey, 1997. Unpublished) indicate concurrence, with a reported 31% breastfeeding rate at 6 months.

Of those infants who initiated breastfeeding, about 67% ($\pm 4\%$) were still breastfeeding at 3 months, 42% ($\pm 4\%$) at 6 months, and 18% ($\pm 4\%$) at 12 months. These figures are higher than those reported for 1994/95 by NPHS (Prairie region: 34% at 6 months) and NLSCY (Prairie region: 29% at 6 months), most likely due to bias from the exclusion by these surveys of children still breastfeeding at the time of the survey. When the NLSCY data were run for the province of Manitoba excluding children who were still breastfeeding at the time of the survey, the calculated rates were similar to those previously reported, with only 55% breastfeeding at 3 months, 26% at 6 months, and 4% at 12 months. This demonstrates the possible underestimation bias of the reported NLSCY data, where duration rates of infants up to one year old could be potentially underestimated by 12 to 16%. It could also explain the lower degree of bias in the NPHS data, since NPHS included children up to five years old and hence there would be a lesser degree of exclusion bias when children still breastfeeding were not used in the calculation of duration rates.

Correlations of perinatal indicators with the healthiness and socioeconomic well-being of populations within a region

The three indicators of newborn health were correlated with PMR and SEFI. The results are shown in Table I. Provincially, those RHAs having less healthy populations and greater socioeconomic risk tended to have lower breastfeeding initiation rates. However, there were no consistent trends with preterm/low birthweight rates and PMR or SEFI in non-Winnipeg RHAs. Within

R represents rural income quintiles, with R1 being the lowest and R5 being the highest income quintile; U represents urban income quintiles, with U1 being the lowest and U5 being the highest income quintile. Statistically significant trends in both rural and urban ($p < 0.001$), using two-tailed Cochran-Armitage trend test.

Figure 4. High birthweight by rural and urban income quintile, 1994-98

Statistical Significance:

* - Rate significantly different from Manitoba mean at $p < 0.05$

N - Rate significantly different from mean for Northern Manitoba at $p < 0.05$

S - Rate significantly different from mean for Rural South Manitoba at $p < 0.05$

Figure 5. Breastfeeding initiation rates by RHA, 1994-98

Winnipeg, community areas having the highest PMR and SEFI also had the highest rates of preterm births, low birthweights, and the lowest breastfeeding initiation rates.

DISCUSSION

About 20% of Manitoba births are at risk for low and high birthweight, with 5.3% low

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Figure 6. Breastfeeding initiation rates by rural and urban income quintile, 1994-98

Figure 7. Percent of all Manitoba infants being breastfed at various time points postpartum NLSCY 1996†

† Of those infants who began to breastfeed, 67% were still breastfeeding at 3 months, 42% at 6 months, and 18% at 1 year

birthweight and 14.9% high birthweight. The Downtown area of Winnipeg, a community area with very poor overall health status, had one of the highest rates of low birthweight (7.2%) and of preterm birth (8.0%) in the province. Looking at income gradients, women in the lowest income quintile were at the greatest risk of giving birth to a low birthweight infant (20% more likely in rural, and 40% in urban areas), compared with women in the highest income quintile.

Preterm births and low birthweights may be associated with maternal stress due to socioeconomic risk, and lifestyle issues such as smoking during pregnancy. The literature suggests that prevention programs could include treatment for maternal hypertension, promotion of smoking cessation, surveillance for infection, and promotion of adequate nutrition.⁶ Downtown Winnipeg has elevated rates of low-income families as well as lone parent families (see the child health report, Chapter

10, at www.umanitoba.ca/centres/mchp), and one third of the women of this area reported smoking during pregnancy. According to the Manitoba Perinatal Health Surveillance Report,²⁸ the preterm birth rate for the province was 7.6%, but among women who smoked, it was 9.5% during 1997 to 1998. Similarly, the low birthweight rate was 5.2% provincially, but 6.9% for women who smoked during pregnancy. RHA decision-makers may need to look upon lifestyle programs (such as smoking cessation and nutrition counselling) as critical to the health and health care costs of newborns as well as adults.

Manitoba high birthweight rates are high at almost 15% of births, with rates especially high in rural and northern areas. As well, women in the lowest rural income quintile were at the highest risk of having a high birthweight baby. By area, Winnipeg had the lowest rate (13.3%) of high birthweight babies in the province, whereas the North region (18.4%) and the South Rural (16.4%) areas have elevated rates. This could partially be due to the widespread problem of Type II diabetes and gestational diabetes in the First Nations women of the province, who make up a substantial proportion of the population giving birth in the North, and who may also be over-represented in the low-income grouping. High birthweight underscores the need for prevention, including maternal nutritional programs and diabetes care during pregnancy.⁶

Breastfeeding initiation rates varied widely by geography, and are strongly associated with the health and socioeconomic well-being of the population. Women in regions having the least healthy population with the greatest socioeconomic risk, as well as women in the lowest income groups, are the least likely to initiate breastfeeding both in urban and rural areas. Given that child illness rates, especially respiratory infection, are elevated in low income groups,²⁹ and that breastfeeding is protective against respiratory infection, provincial health care providers and decision-makers need to support regional programs to promote breastfeeding, especially to high-risk groups. According to the World Health Organization, recommendations for breastfeeding include exclusive breastfeeding for the first six months of life, followed by breastfeeding up to two years old and beyond.³⁰ In this report, only 42% ($\pm 4\%$) of babies who initiated breastfeeding were

breastfed for at least 6 months, and the rates of exclusive breastfeeding would most likely be much less than this. The necessity for providing individual breastfeeding support to women, and societal support through government policies, is underscored by the duration rates falling short of international recommendations.

Significant factors affecting the health of children born in Manitoba could be addressed through systematic programs both during pregnancy and during the postpartum period, including support for nutritional counselling, promotion of breastfeeding, smoking cessation programs, and social policy decisions designed to overcome the health disparities within low-income groups, and within populations with poorer overall health status.

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TABLE 1

Association of Child Indicators with Population Health Indicators

Health Indicator*	Correlation Coefficient of Indicator with Premature Mortality Rate (PMR)	Correlation Coefficient of Indicator with the Socioeconomic Factor Index (SEFI)
Preterm birth rate (n=23)	0.09	0.25
RHAs (non-Winnipeg)	-0.05	-0.06
Winnipeg CAs	0.41	0.67†
Low birthweight (n=22)	-0.07	0.10
RHAs (non-Winnipeg)	-0.07	-0.05
Winnipeg CAs	0.67†	0.75†
High birthweight (n=22)	-0.27	-0.18
RHAs (non-Winnipeg)	0.56	0.59
Winnipeg CAs	-0.49	-0.58†
Breastfeeding initiation rate (n=23)	-0.79\$	-0.69‡
RHAs (non-Winnipeg)	-0.49	-0.44
Winnipeg CAs	-0.94\$	-0.87‡

* Each of the 11 non-Winnipeg Regional Health Authority regions (RHAs) and the 12 Winnipeg Community Areas (Winnipeg CAs) was included in the Spearman's correlations with PMR and SEFI. In some regions the rate was suppressed due to small numbers. The level of significance of the correlation coefficient is indicated by the following: † p<0.05; ‡ p<0.002; \$ p<0.0001; ^{||} p<0.10, not statistically significant at the p<0.05 criterion but possibly showing a trend.

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RÉSUMÉ

Objectif : Le Centre d'élaboration et d'évaluation de la politique des soins de santé du Manitoba a été mandaté par le ministère manitobain de la Santé pour étudier l'état de santé des nouveau-nés nés entre 1994 et 1998 selon trois indicateurs : les naissances avant terme (<37 semaines de gestation), le poids à la naissance et l'alimentation du nourrisson.

Méthode : Les données ont été dérivées du Population Health Research Data Repository et de l'Enquête longitudinale nationale sur les enfants et les jeunes (1996). On a examiné les écarts entre 12 ORS et 12 CR de Winnipeg, ainsi que leurs liens avec l'état de santé et le bien-être socio-économique de la population.

Résultats : Le taux de naissance avant terme au Manitoba était de 6,7 % des naissances vivantes et variait de 5,3 % à 7,4 % selon l'ORS et de 5,7 % à 8,0 % selon le CR de Winnipeg. Le taux manitobain d'insuffisance de poids à la naissance (<2 500 g) était de 5,3 % et variait de 2,7 % à 5,7 % selon l'ORS et de 4,4 % à 7,2 % selon le CR. Plus le revenu était faible, plus la probabilité d'une insuffisance de poids à la naissance était forte (p<0,05). Le taux d'allaitement maternel au Manitoba était de 78 % et variait de 64 % à 87 % selon l'ORS et de 66 % à 90 % selon le CR. Plus le revenu et l'état de santé de la population étaient faibles, plus le taux d'allaitement l'était aussi (p<0,001). Parmi les femmes ayant allaité, 42 % l'avaient fait pendant au moins six mois.

Conclusion : On pourrait agir sur les facteurs qui influent sur la santé des enfants manitobains par le biais de programmes systématiques durant la grossesse et la période post-partum, notamment en appuyant le counselling nutritionnel, la promotion de l'allaitement, le renoncement au tabac et les politiques sociales visant à combler les écarts au sein des groupes à faible revenu et des populations dont l'état de santé est relativement mauvais.