

Breastfeeding Among the Ontario James Bay Cree

A Retrospective Study

Ray Black, MD¹

Marshall Godwin, MD, MSc, CCFP²

David Ponka, MDCM, CCFP(EM)³

ABSTRACT

Background: Although previous unpublished research has demonstrated low breastfeeding rates among the James Bay Cree of Northern Ontario, the reasons for this are not immediately clear.

Methods: A retrospective medical chart review of women who had given birth at the Weeneebayko General Hospital in Moose Factory, Ontario in the seven-year period 1997 to 2003 was performed. A variety of demographic variables were documented and overall breastfeeding initiation rates and yearly variations were assessed.

Results: Univariate chi-square analysis of the data indicated that young maternal age (mean=23; $p=0.001$), maternal smoking (average rate=52.1%; $p=0.03$), living location (in a small coastal community; $p=0.001$) and low education status (not completing high school; $p<0.001$) were risk factors for a mother choosing not to breastfeed. Regression analysis revealed that only living in small coastal communities and not having post-secondary education were independently associated with not breastfeeding. Absence of a partner nearly reached statistical significance on regression analysis ($p=0.056$). The overall breastfeeding initiation rates (51.9%, 95% CI: 49.3-54.5) were confirmed to be lower than the national average (78%), and the rate has remained low over the seven years of the study.

Conclusion: These results should help clarify why some mothers in the Moose Factory region are at risk of not breastfeeding. This information will be useful in directing future research on the differences in breastfeeding rates among different Aboriginal Peoples' communities, and assist in the development of program policies specific to women who have one or more of the identified risk factors.

Key words: Indians, North American; risk factors; breast feeding; retrospective study

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

1. Queen's University, Kingston, ON

2. Professor, Discipline of Family Medicine, Memorial University of Newfoundland, St. John's, NL

3. Assistant Professor, Department of Family Medicine, University of Ottawa, Ottawa, ON

Correspondence and reprint requests: Dr. David Ponka, Department of Family Medicine, University of Ottawa, 75, rue Bruyère, Ottawa, ON K1N 5C8, Tel: 613-241-1154, Fax: 613-241-1971, E-mail: dponka@scohs.on.ca

Acknowledgements: The authors express their gratitude to all who helped in the production of this research. At Weeneebayko Hospital, Sheila Watt, Zone Nursing Officer, helped characterize the study population and made helpful suggestions; Connie Suite provided detailed population totals for the James Bay First Nations communities; and Melanie Newell, Hospital Dietitian, gave insights into breastfeeding education in the hospital and in the local communities. Our appreciation is also extended to everyone in the Medical Records department for their help during the data collection phase, especially Trina Richard.

Aboriginal Peoples in Canada have a disproportionately high incidence of chronic disease when compared to the rest of the population.¹ Breastfeeding has been shown to reduce morbidity from conditions such as diabetes,² hypertension³ and obesity^{3,4} commonly found in Aboriginal Peoples' communities. Despite the recognized benefits of breastfeeding, low breastfeeding rates have been reported in Aboriginal Peoples' communities.⁵⁻⁹ Health care personnel working in Cree communities on the shores of James Bay in Northern Ontario have long suspected that breastfeeding rates were low in this area, and although our recent unpublished data confirm this,¹⁰ no studies examining the underlying risk factors for this have been done.

Attempts are currently underway at the regional hospital serving the Ontario James Bay region to reverse the low breastfeeding trend. Part of this strategy is based on the UNICEF 'Baby Friendly Hospital' initiative¹¹ which is supported by WHO evidence.¹² However, while acknowledged to be effective, the WHO and UNICEF programmes tend to be genericized and not specific to Canada's Aboriginal People. Thus, we hope our research will provide data for education and breastfeeding promotion programmes that would be culturally sensitive and specific to this population's needs.

The primary focus of the present research was to identify specific socio-economic circumstances that are associated with Cree mothers not breastfeeding. A secondary focus was to quantify breastfeeding initiation and to determine any positive or negative trends in recent years.

METHODS

Weeneebayko General Hospital is located in the Moose Factory First Nations community at the southern end of James Bay. It is Cree-run and is the main source of health care services for approximately 9,000 people living in communities along the Ontario James Bay coast. All of these are Cree First Nations communities, with the exception of Moosonee which is a corporation. Overall, the region's population is 97% Aboriginal.

Prenatal care is delivered by family physicians and community health nurses, and women are transferred to Moose

Factory prior to delivery. All births at Weeneebayko Hospital are logged in the Medical Records Department. Over the seven-year study period (1997-2003), 903 births occurred at the hospital and 53 elsewhere (mainly at Timmins District Hospital, the secondary care centre for the region) for a total of 956. However, only those births occurring at the Weeneebayko Hospital were included to avoid confounders inherent in delivering outside one's cultural milieu. Also, a full complement of antenatal forms and other hospital records were often not available for those giving birth in other locations. Similarly, births in the community, but beyond the organized health care system, could not be compared due to lack of reliable records.

Using an online sample size calculator (Raosoft Sample Size Calculator)¹³ we determined that at least 278 people were required to accurately (95% confidence) represent a variable with 50% distribution in a population of 1,000 individuals. We then pulled every third chart out of the 903 eligible charts for a sample of 297.

A search of Medline during the years 1980-2004, using the MeSH key words "Breast Feeding" and "North American Indians" (limiting to English language) resulted in 55 articles. From these articles, we compiled a list of variables that may be associated with the decision not to breastfeed. Table I lists these variables along with a definition of each variable.

A retrospective chart review was then performed over a two-month period and the data were analyzed to determine breastfeeding rates and to look for associations between demographic variables and breastfeeding. All data were entered directly into an Excel file and were identified only by chart number. No reference to the mother's name or other identifying information was recorded within this file.

Subsequently, we used SPSS, version 14.0 (SPSS Inc., Chicago, IL) for analysis. Each individual variable was tested for association with breastfeeding choice using chi-square analysis or Student T-test, as appropriate. Three variables (parity, home community and education level) were grouped for analysis. Parity was grouped as first baby (primip) or other; home community was grouped such that people from Moose Factory or Moosonee were included together and those from the smaller coastal

TABLE I

Definitions of Variables Collected from Medical Charts

Breastfeeding at discharge	Mother was exclusively breastfeeding at discharge
Baby D.O.B.	Last baby's date of birth between Jan 1, 1997 and Dec 31, 2003
Home community	Location of mother's residence at time of birth
Maternal age	Mother's age at birth of baby
Parity	Number of live births by mother
C-section last birth	Last birth was by caesarean section
Previous c-section	Mother had had a caesarean section during a previous birth
Maternal smoking	Mother smoked during the last pregnancy
Alcohol use	Mother consumed alcohol during the last pregnancy
Medication use	Mother was taking medication(s)* at discharge
Partner present	Mother was married or living common-law
Educational level	Mother's highest attained educational level

* Other than routine analgesics, laxatives, minerals (e.g., Fe) and vitamins.

communities of James Bay were grouped together; education level was grouped as post-secondary, completed high school, some high school, and elementary school for descriptive purposes, but was grouped as post-secondary and high school vs. all others or post-secondary vs. all others for comparative analysis. Logistic regression was used to test for the independence of the associations found with univariate analysis. The dependent variable was whether or not they were breastfeeding at discharge; all the variables tested with univariate analysis were entered as independent variables. A Backward Stepwise removal approach was used with $p=0.1$ as the removal level.

Ethics approval was obtained from the Weeneebayko General Hospital ethics committee prior to any data collection, and input from local health representatives was sought through all phases (see acknowledgements).

RESULTS

Table II contains a summary of our study population characteristics as well as the results of univariate analysis. The Moose Factory region's breastfeeding initiation rate of 51.9% (95% CI: 49.3-54.5) compared unfavourably to the Canadian national average of 78%.¹⁴ Furthermore, a large proportion of women were of young age, lower educational status, smoked and used medications not routine to the peripartum period.

The variables recorded in the retrospective chart review are subcategorized and examined using chi-square analysis or Student T-test in Table II. Four variables were found to have a statistically significant ($p<0.05$) association with the choice not to breastfeed: younger mothers (espe-

cially teenage mothers) tended to breastfeed less ($p=0.001$), as did mothers who smoked ($p=0.03$); those with less than a grade 12 education were less likely to breastfeed than those who had higher education ($p<0.001$), and those not living in Moose Factory or Moosonee ($p=0.001$). Mothers who were neither married nor living common law were less likely to breastfeed than those who were, but this did not quite reach statistical significance in the univariate analysis ($p=0.11$).

Using logistic regression, only three variables remained in the model as independently associated with breastfeeding: living on the coast rather than in Moose Factory or Moosonee (OR 13.6; 95% CI 6.2-29.3; $p=0.001$); having less than post-secondary education (OR 5.3; 95% CI 1.1-25.7; $p=0.036$); and being single (OR 2.9; 95% CI 0.97-9.2; $p=0.056$).

The data in Table III compare numbers of women initiating breastfeeding between 1997 and 2003. Chi-square analysis for trend does not show a significant difference in breastfeeding rates over time ($p=0.78$). Breastfeeding initiation rates remained low during the seven years included in the study.

DISCUSSION

Our results agree with previous research on breastfeeding predictors, including work done by Matthews¹⁵ in Newfoundland and Labrador. That study also identified low income, failure to attend prenatal classes and Aboriginal ethnicity as risk factors associated with not breastfeeding. Although we were not able to discern income levels during our chart review, our study population is economically disadvantaged when compared with the general population of Canada.

TABLE II
Population Characteristics and Univariate Analysis of Associations with Breastfeeding

	Full Study Population (N=297)	Women Breastfeeding at Discharge (N=154)	Women Not Breastfeeding at Discharge (N=143)	OR (95% CI) for Breastfeeding	P Value
Maternal age [Mean (SD)]	23 (5.5)	24.4 (5.7)	21.7 (5)	NA	0.001
Maternal age 25 years or less	201 (67.7%)	90 (58.4%)	111 (77.6%)	0.41 (0.24-0.67)	0.001
Parity [Median (Range)]	2 (1-10)	2 (1-10)	2 (1-10)		
Mother's first baby (Primip)	95 (32%)	50 (32.5%)	45 (31.5%)	1.05 (0.64-1.70)	0.85
Caesarean section this pregnancy [N (%)]	64 (21.5%)	34 (22.1%)	30 (21.0%)	1.07 (0.61-1.86)	0.90
Mother smoked during this pregnancy [N (%)]	146 (49.2%)	66 (42.9%)	80 (55.9%)	0.59 (0.37-0.94)	0.03
Mother used alcohol during this pregnancy [N (%)]	45 (15.2%)	23 (14.9%)	22 (15.4%)	0.97 (0.51-1.82)	0.91
Medication use* [N (%)]	63 (21.2%)	32 (20.8%)	31 (21.7%)	0.95 (0.54-1.65)	0.96
Married or living with partner [N (%)]	254 (85.5%)	137 (89%)	117 (81.8%)	1.79 (0.93-3.46)	0.11
High school or post secondary education† [N (%)]	63 (32.6%)	44 (45.8%)	19 (19.6%)	3.5 (1.8-6.6)	0.001
Education level† [N (%)]					
Post secondary	31 (16.1%)	29 (30.2%)	2 (2.1%)		
Finished high school	32 (16.6%)	15 (15.6%)	17 (17.5%)		
Some high school	104 (53.8%)	47 (49.0%)	57 (58.8%)		
Elementary school	26 (13.5%)	5 (5.2%)	21 (21.6%)		
Lives in Moose Factory or Moosonee Community	156 (52.5%)	119 (77%)	37 (25.9%)	9.74 (5.73-16.56)	0.001
Moose Factory	94 (31.7%)	75 (79.8)	19 (20.2)		
Moosonee	62 (20.9%)	44 (71.0)	18 (29.0)		
Fort Albany	18 (6.1%)	1 (5.6)	17 (94.4)		
Kashachewan	60 (20.2%)	11 (18.3)	49 (81.7)		
Attaswapiskat	52 (17.5%)	12 (23.1)	40 (76.9)		
Peawanuk	9 (3.0%)	9 (100.0)	0 (0.0)		
Other	2 (0.6%)	2 (100.0)	0 (0.0)		

* Other than routine analgesics, laxatives, minerals (e.g., Fe) and vitamins.

† Data on 193 only. Percentages based on a denominator of 193.

TABLE III
Breastfeeding Rates from 1997 to 2003, Inclusive

Year	Number of Births at Weeneebayko	Total Sampled per Year	Breastfeeding N (%)
1997	147	46	25 (54.3)
1998	137	46	20 (43.5)
1999	113	38	25 (65.8)
2000	139	45	25 (55.6)
2001	147	50	23 (46.0)
2002	111	37	16 (43.2)
2003	109	35	20 (57.1)

Parity was not an independent predictor for breastfeeding choice in either this study or that of other researchers.¹⁵⁻¹⁷ The relatively large variation in age and parity of women from the James Bay communities may explain our finding. Some women had many children at a younger age, whereas others had them over a longer period. The latter may have waited until they had finished their education or were in a stable relationship before getting pregnant again.

Smoking was relatively common among the women included in this study, again confirming research conducted in other Cree communities.⁹ Over half (52.1%) of mothers whose chart included information on this variable smoked. Our univariate analysis suggested smoking was associated with a choice not to breastfeed; however this was not upheld with regression analysis. Other research¹⁸ has revealed the mistaken belief that smoking while breastfeeding is worse for the baby than not breastfeeding.

There were several limitations to gathering data in this study. For example, there

was a finite time span for finding and logging the data. With more time, a greater proportion of charts could have been pulled and a higher percentage of complete ones included. The most common barrier to obtaining information was finding incomplete prenatal forms. Frequently, missing information had to be searched for in other areas of the patient's chart. Also, because of an apparent relationship between decision to breastfeed and mother's home community, it would have been preferable to have a more proportional number of subjects from each community to further verify and evaluate this finding.

Nevertheless, possibly our most important finding was this difference in breastfeeding rates among women living in the small coastal James Bay communities compared to Moose Factory and Moosonee. Explanations for this are probably multifactorial and may have their origins in local custom, proximity to health care providers, and availability of antenatal information and training. In Peawanuk, where limited

data indicated women breastfed exclusively, the reason may be as simple as a lack of affordable baby formula. Anecdotal information also suggested that the people of Peawanuk live a more traditional hunter-gatherer lifestyle than their First Nations neighbours to the south and this may have had some further impact on their choice of infant feeding.

The use of qualitative questionnaires and interviews would be a valuable method of expanding on the knowledge gained in this study. A limited study¹⁰ of this type has been performed in the Moose Factory area. However, one of much larger scope, that would explore attitudes in the more distant communities, is needed. Other researchers have recognized that differences between Aboriginal Peoples' communities^{1,5,19,20} and even within individual bands^{1,6,7} exist, and these should be taken into consideration when formulating educational and promotional strategies to increase breastfeeding.

The education programmes available at Weeneebayko General Hospital may explain why breastfeeding rates were higher in the Moose Factory and Moosonee areas. Women in these two communities obtain much of their primary care through the Hospital and would have far greater exposure to healthy promotional materials and individualized counselling. However, it has been shown in a number of studies that the mother's decision to breastfeed is often

made in advance of contact with health care personnel^{16,21-23} and she may be more influenced, positively or negatively, by her culture, partner or family.^{7,15,19,24} It is, therefore, important that efforts to increase breastfeeding be more broadly based within the community.^{1,7,15,25} The current study revealed a relatively high number of teen pregnancies (14.5% of mothers gave birth at 17 years or younger, the youngest being 13 years), and also a high number of pregnancies among women who had not yet completed high school (67.4% of those whose education was documented). Thus, it would be advantageous to target school children at an early age.

Future research and health promotion activities among the Cree of Northern Ontario should also explore breastfeeding duration. Our work could only look at initiation rates, but previous research^{6,8,23} has shown abrupt discontinuation rates among First Nation mothers once discharged from hospital and the reasons for this are not always clear. What is more clear is that ongoing efforts to promote exclusive breastfeeding among the Ontario James Bay Cree will help lessen the increasing burden of chronic diseases such as type 2 diabetes,² obesity^{3,4} and hypertension.³

REFERENCES

1. Health Canada. Ottawa; Government of Canada. Toward a Healthy Future. Available online at: http://www.hc-sc.gc.ca/hppb/phdd/pdf/toward/toward_a_healthy_english.PDF (Accessed June 14, 2004).
2. Young TK, Martens PJ, Taback SP, Sellers EA, Dean HJ, Cheang M, et al. Type 2 diabetes mellitus in children. *Arch Pediatr Adolesc Med* 2002;156:651-55.
3. von Kries R, Koletzko B, Sauerwald T, von Mutius E, Barnert D, Grunert V, et al. Breast feeding and obesity: Cross sectional study. *BMJ* 1999;319:147-50.
4. Willows ND, Morel J, Gray-Donald K. Prevalence of anemia among the James Bay Cree infants of northern Quebec. *CMAJ* 2000;162(3):323-26.
5. Wright AL, Bauer M, Naylor A, Sutcliffe E, Clark L. Increasing breast feeding rates to reduce infant illness at the community level. *Pediatrics* 1998;101(5):837-44.
6. Martens PJ, Young TK. Determinants of breast feeding in four Canadian Ojibwa communities: A decision-making model. *Am J Hum Biol* 1997;9:579-93.
7. Whelen Banks J. Ka'nisterenhsera. Teiakotihnsie's. A Native community rekindles

- the tradition of breast feeding. *AWHONN Lifelines* 2003;7(4):341-47.
8. Martens PJ. Increasing breast feeding initiation and duration at a community level: An evaluation of Sagkeeng First Nation's community health nurse and peer counselor programs. *J Hum Lact* 2002;18(3):236-46.
 9. Willows ND, Iserhoff R, Napash L, Leclerc L, Verrall T. Anxiety about food supply in Cree women with infants in Quebec. *Int J Circumpolar Health* 2005;64(1):55-64.
 10. Ponka D, Carriere B. Breast feeding initiation and maintenance rates in a remote Cree region of Ontario, Canada. Unpublished work. 2003.
 11. UNICEF. New York. The baby-friendly hospital initiative. Available online at: <http://www.unicef.org/programme/breastfeeding/baby.htm> (Accessed June 14, 2004).
 12. World Health Organization. Geneva. Evidence for the ten steps to successful breast feeding. Available online at: www.who.int/child-adolescenthealth/New_Publications/NUTRITION/WHO_CHD_98.9.pdf (Accessed June 14, 2004).
 13. Raosoft Inc. Seattle. Raosoft online sample size calculator. Available online at: http://www.raosoft.com/sample_size.html (Accessed May 14, 2004).
 14. Statistics Canada. Ottawa; Government of Canada. 2001 Health Indicators: Breast feeding practices. Available online at: <http://www.statcan.ca/english/freepub/82-221-XIE/00502/tables/pdf/2171.pdf> (Accessed June 14, 2004).
 15. Matthews K, Webber K, McKim E, Banoub-Baddour S, Laryea M. Maternal infant-feeding decisions: Reasons and influences. *Can J Nurs Res* 1998;30(2):177-98.
 16. Shaker I, Scott JA, Ried M. Infant feeding attitudes of expectant parents: Breastfeeding and formula feeding. *J Adv Nurs* 2004;45(3):260-68.
 17. McInnes R, Love J, Stone D. Independent predictors of breast feeding intention in a disadvan-

- taged population of pregnant women. *BMC Public Health* 2001;1(10). Available online at: <http://www.biomedcentral.com/content/pdf/1471-2458-1-10.pdf> (Accessed June 14, 2004).
18. Hogan SE. Overcoming barriers to breastfeeding: Suggested breastfeeding promotion programs for communities in Eastern Nova Scotia. *Can J Public Health* 2001;92(2):105-8.
 19. Dodgson JE, Duckett L, Garwick A, Graham BL. An ecological perspective on breast feeding in an indigenous community. *J Nurs Scholarsh* 2002;34(3):325-41.
 20. Dodgson JE, Struthers R. Traditional breastfeeding practices of the Ojibwe of Northern Minnesota. *Health Care Women Int* 2003;24:49-61.
 21. Earle S. Why some women do not breastfeed: Bottle feeding and fathers' role. *Midwifery* 2000;16:323-30.
 22. Dix DN. Why women decide not to breastfeed. *Birth* 1991;18(4):222-25.
 23. Macaulay AC, Hanusaik N, Beauvais JE. Breastfeeding in the Mohawk community of Kahnawake: Revisited and redefined. *Can J Public Health* 1989;80:177-81.
 24. Stewart-Knox B, Gardiner K, Wright M. What is the problem with breastfeeding? A qualitative analysis of infant feeding perceptions. *J Hum Nutr Dietet* 2003;16:265-73.
 25. Health Canada. Ottawa; Government of Canada/The Joint Working Group. Nutrition for healthy term infants: Statement of the Joint Working Group of Canadian Paediatric Society, Dieticians of Canada, Health Canada. Available online at: www.hc-sc.gc.ca/dca-dea/publications/pdf/infant_e.pdf (Accessed June 14, 2004).

Received: July 14, 2006

Revisions requested: January 25, 2007,
May 22, 2007 and August 24, 2007

Revised mss: March 27, 2007, July 4, 2007 and
September 17, 2007

Accepted: October 4, 2007

RÉSUMÉ

Contexte : Des études encore inédites font état de faibles taux d'allaitement chez les Cris de la baie James du Nord de l'Ontario, mais les raisons de cette situation n'apparaissent pas clairement.

Méthode : Nous avons mené une étude rétrospective des fiches médicales des femmes ayant accouché à l'hôpital général Weeneebayko de Moose Factory (Ontario) sur une période de sept ans (1997 à 2003). Nous avons documenté diverses variables démographiques et analysé les taux d'allaitement maternel globaux et leurs variations annuelles.

Résultats : Une analyse du khi-carré univariée a montré que le jeune âge des mères (moyenne=23 ans; $p=0,001$), le tabagisme maternel (taux moyen=52,1 %; $p=0,03$), le lieu de vie (petite localité côtière; $p=0,001$); et la sous-scolarisation (abandon des études secondaires; $p<0,001$) étaient des facteurs de risque de ne pas allaiter. Une analyse de régression a montré que seules deux variables (vivre dans une petite localité côtière et ne pas avoir fait d'études postsecondaires) étaient liées de façon indépendante au fait de ne pas allaiter. L'absence de partenaire était aussi très proche d'avoir une signification statistique selon l'analyse de régression ($p=0,056$). Les taux d'allaitement maternel globaux (51,9 %, IC de 95 % = 49,3-54,5) étaient effectivement plus faibles que la moyenne nationale (78 %) et le sont demeurés pendant les sept années de l'étude.

Conclusion : Ces résultats devraient contribuer à clarifier pourquoi certaines mères de la région de Moose Factory risquent de ne pas allaiter. Cette information sera utile pour orienter les études futures des différences dans les taux d'allaitement de diverses communautés autochtones; elle devrait aussi faciliter l'élaboration de politiques et de programmes axés sur les femmes qui présentent un ou plusieurs des facteurs de risque indiqués.

Mots clés : Amérindiens; facteurs de risque; allaitement; étude rétrospective