

Otitis media

How are First Nations children affected?

MOLLY THOMSON, PHD

SUMMARY

To determine whether otitis media affects First Nations children more severely than other children, I studied the data on otitis media occurrence among these children; on risk factors, particularly bottle feeding; and on prevention and treatment. First Nations children do seem to have more severe otitis media than other children. Health promotion might help ameliorate the situation. Supporting breastfeeding in the community is strongly recommended.

RÉSUMÉ

Pour déterminer si l'otite moyenne affecte plus sévèrement les enfants des Premières Nations que les autres enfants, j'ai révisé l'information médicale concernant l'occurrence de l'otite moyenne chez ces enfants, les facteurs de risque incluant particulièrement l'allaitement au biberon, la prévention et le traitement. Les enfants des Premières Nations semblent présenter une forme plus sévère d'otite moyenne comparativement aux autres enfants. La promotion de la santé pourrait contribuer à améliorer la situation. Il est fortement recommandé d'encourager l'allaitement maternel au sein de la communauté.

Can Fam Physician 1994;40:1943-1950.

.....

PHYSICIANS ARE CONCERNED about the severity of otitis media among First Nations* children. Concern stems from the possible effect of hearing loss from chronic otitis media on language acquisition and cognitive achievement.¹ Some authors have suggested First Nations children have a genetic predisposition to chronic otitis media, although no data support this hypothesis.² This paper presents available data on the severity, history, risk factors, prevention, and treatment of otitis media among First Nations children.

Severity

Available data. I collected data on the occurrence of otitis media and hearing loss among First Nations children (excluding the Inuit). Data on upper respiratory infection were included because of similar etiology.³

.....

Dr Thomson is an epidemiologist with the British Columbia Ministry of Health's Research and Evaluation Branch.

**First Nations* is used throughout this article to refer to the aboriginal and indigenous inhabitants of Canada and their descendants; *Inuit* refers to the Native peoples of the Arctic. *Registered Indians* refers to First Nations people registered with the federal government as *Indians* according to the terms of the *Indian Act*.

I obtained population data from Saskatchewan comparing "Registered Indian" children with other children. These data indicated numbers of physician visits during fiscal year 1990-1991 and hospitalizations during 1978-1979.⁴ I also located two small studies of Registered Indians in Southern Ontario⁵ and British Columbia,⁶ and a 1965 survey of middle ear disease on a reservation in British Columbia.⁷

Frequency of hospitalization.

*Table 1*⁴⁻⁶ shows hospitalization rates for otitis media and upper respiratory infection for children younger than 5 years. Each data set shows a similar differential, with First Nations children entering hospital five to nine times more often than other children.

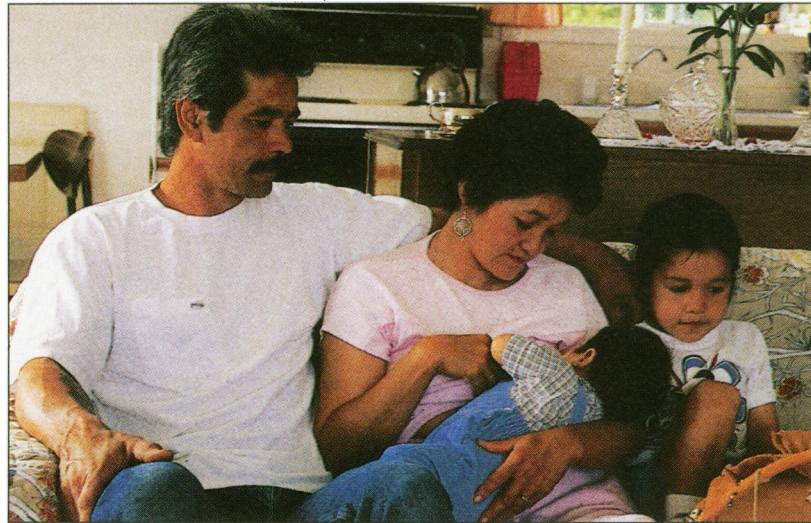
Some health care providers believe First Nations children are hospitalized more readily than other children for the same problem. While some differential could be attributable to hospitalization factors, no hard evidence proves this. In fact, one study showed First Nations children were sicker than other children hospitalized for pneumonia in a Saskatoon hospital (fever and adventitious sounds persisted twice as long and hospital stays lasted more than three times as long).⁸ In British

CME

.....

Otitis media
*How are First Nations
children affected?*

Columbia also, hospital stays for respiratory infections were longer for First Nations children than for other children.⁹ The consistency and size of the differential between hospitalization rates for First Nations and other children point to more severe disease among First Nations children.



Breastfeeding offers protection

against infection: *Health care workers should assist the community to reestablish a supportive environment for breastfeeding mothers.*

.....
Frequency of physician visits.

Otitis media is the most common illness for which North American children visit a physician.¹⁰ By age 7, more than 90% of children in a Boston study had diagnosed middle ear infection.^{11,12} Do First Nations children receive adequate primary care for this common disease? If not, this might explain their high hospitalization rates.

Table 2 gives 1990-1991 Saskatchewan billing data comparing the percentage of First Nations children with other children for one or more physician visits for otitis media. The lack of differential between First Nations and other children is striking in light of the difference in hospitalization rates noted above. The only consistent difference was between boys and girls; boys more frequently had one or more physician visits.

Diagnostic coding on provincial billing data is of questionable accuracy. But such data provide the best population estimates we have. Furthermore

the rates shown were reasonable, with 29% to 49% of children having one or more physician visits for otitis media. While higher percentages likely would be found in a study aimed especially at diagnosing otitis media (such a study of 677 children in Boston found 62% with at least one episode of otitis media before their first birthday¹²), there is no reason to suspect a differential bias.

Another small data set compared physician visits for 99 infants of the Oneida, Chippewa, and Muncey bands in southern Ontario with visits for 316 other infants in the area.⁵ First Nations infants had three times as many office visits for otitis media and twice as many visits for upper respiratory tract illness.

Available evidence indicates that First Nations parents seek medical care for otitis media at least as frequently as other parents. No data show whether First Nations parents wait longer before seeking care or whether these findings apply to parents in all regions.

History of an epidemic

Previous epidemic among First Nations children. A 1962 survey of otitis media on the Mount Currie First Nations reservation in British Columbia found past ear disease was surprisingly prevalent.⁷ Among the reservation population, 34% had scarred eardrums and healed perforations and 31% had hearing loss (results were not given separately for children). Corroborating this evidence of a previous epidemic of severe otitis media are physicians working with First Nations peoples in Queen Charlotte City and New Aiyansh, BC. They relate (in personal communications) that signs of severe childhood ear disease are common among older adults, while severe otitis media is rare among children today.

Current epidemic among Inuit children.

The history of otitis media among the Inuit could help us understand the disease in First Nations peoples. In 1975, Manning¹³ noted

that most of the adult Inuit population in the eastern Arctic had normal eardrums with no evidence of previous otitis media. Also, older Inuit did not recall that their children suffered from draining ears. Baxter¹⁴ reported the incidence of healed or persistent otitis media to be five times higher among Inuit living in larger settlements than among those living in more traditional ways. The Inuit seem to have been relatively free from severe otitis media when they lived in traditional ways.

Currently, Inuit children frequently suffer from severe otitis media. A 1987 study compared Inuit and Cree school-children living in the same community on the east coast of Hudson Bay.¹⁵ Evidence of ear disease showed up in 78% of Inuit children but in 12% of Cree children. Hearing loss affected

23% of Inuit children but only 4% of Cree children. An otitis media epidemic appears to have developed among the Inuit in the last 40 years along with the change to modern living. Baxter suggests, however, that the epidemic could be subsiding now as the Inuit adjust to urbanization and contact with outsiders.¹⁴

Both Manning and Baxter offer several hypotheses for such an epidemic among the Inuit.^{13,14} The initiation of regular contact with the outside world brought pathogens for which the Inuit had little or no immunity. Dietary change to refined carbohydrates could have altered immune resistance. Also, the change from breastfeeding to bottle feeding is implicated; several studies have examined the risks of bottle feeding.^{3,12,16-21}

Table 1. Hospitalization of First Nations children for otitis media and upper respiratory infection compared with other children

PLACE OF DIAGNOSIS	NO. OF CHILDREN		HOSPITALIZATIONS PER 100 CHILDREN		RELATIVE RISK (95% CONFIDENCE INTERVAL)
	FIRST NATIONS	OTHER	FIRST NATIONS	OTHER	
OTITIS MEDIA					
Saskatchewan ⁴					
• Boys 1-4 y	2623	30 025	6.7	1.1	6.1 (5.1-7.3)
• Girls 1-4 y	2632	28 047	5.6	0.8	6.7 (5.4-8.2)
Southern Ontario ⁵ children 0-1 y	96	295	2.1	0.3	6.1 (0.6-67.0)
UPPER RESPIRATORY INFECTION					
Saskatchewan ⁴					
• Boys 0-1 y	649	7689	27.1	4.8	5.7 (4.8-6.7)
• Girls 0-1 y	642	7255	27.4	3.1	8.9 (7.4-10.6)
• Boys 1-4 y	2623	30 025	24.7	5.2	4.7 (4.3-5.1)
• Girls 1-4 y	2632	28 047	22.9	3.8	6.1 (5.6-6.7)
Southern Ontario ⁵ children 0-1 y	96	295	5.2	0.7	7.7 (1.5-38.9)
BC children 0-4 y* living in small cities and towns ⁶	1098	36 398	8.1	1.7	4.7 (3.8-5.9)

* Thomson and Philion⁶ estimated First Nations children's hospitalization to be low because it included only Registered Indians while the base population included all those identified as "aboriginal ethnic origin" in the 1986 census.

Dufour investigated cultural factors that might explain why Inuit children are now severely affected by otitis media.^{22,23} She observed the Inuit believe the cold should be endured so take their infants outdoors frequently (while Cree children living in the same location on Hudson's Bay are not taken outside regularly until 2 years old). The change to heated homes from igloos undoubtedly affects the temperature gradient between indoors and outdoors. A network of beliefs and behaviours could stress the immune and psychoneuroendocrine systems of children whose parents are undergoing rapid cultural change.

Epidemics among other peoples.

The children of peoples adapting rapidly to industrialized life in other countries also have epidemics of severe otitis media. According to physicians who have worked abroad, Bedouin, Fijian, Thai, and Nepalese children have middle ear disease that can be "phenomenal in amount and degree of pathology."²⁴⁻²⁷ The problem is particularly serious in some Australian Aboriginal communities where hearing loss due to otitis media has been reported in up to 50% of schoolchildren.²⁸

It seems that children of indigenous peoples suffer severely from otitis media in times of cultural disintegration. Epidemics gradually subside as the population adapts to the cultural change. On this continuum, Canadian First Nations children could currently be near the end of their epidemic.

Risk factors

Genetic predisposition. Some authors suggest that the severity of otitis media among indigenous peoples is due to genetic predisposition. Todd and Bowman² believe that a difference in the shape of the eustachian tube could be responsible for middle ear infections in Apache Indians, although they cite no evidence.

Known genetic risk factors are not specific to First Nations children. Boys are known to have higher rates of otitis media than girls.^{12,29} Sibling history of recurrent middle ear infection is an important risk factor. In a Boston study, the odds of recurrent otitis media in the first year of life were more than three times higher for children whose siblings had had the disease than for those whose siblings had not.¹² Siblings, of course, usually share both genes and environment.

Environmental factors. While genetic factors undoubtedly influence susceptibility, they do not explain why peoples of various races are similarly affected in times of rapid cultural change. Environmental factors must play a role. Socioeconomic factors, perhaps surprisingly, have not been found associated with otitis media. No relationship was seen between the occurrence of otitis media and parents' occupation and education in the Boston study¹²; mothers' education in a study of Pima children³; living conditions or mothers' education in a study of Apache, Navajo, and Hopi children³⁰;

Table 2. Physician visits for otitis media among First Nations children compared with other children in Saskatchewan: Data provided by the Medical Care Insurance Branch of Saskatchewan Health for 1990-1991.

PATIENTS	NO. OF CHILDREN (% HAVING PHYSICIAN VISITS)		RELATIVE RISK (95% CONFIDENCE INTERVAL)
	FIRST NATIONS	OTHER	
Boys 0-1 y	1129 (40.6)	5371 (44.1)	0.9 (0.8-1.0)
Girls 0-1 y	1073 (36.2)	6547 (29.0)	1.2 (1.1-1.4)
Boys 1-4 y	4210 (42.7)	29 876 (48.7)	0.9 (0.8-0.9)
Girls 1-4 y	3983 (41.0)	28 353 (43.6)	0.9 (0.9-1.0)

or living conditions in a study of Eskimo children.³¹

Bottle feeding. Bottle feeding as a risk factor for otitis media has been repeatedly studied. *Table 3* lists eight cohort studies, one of which involved Canadian First Nations children.^{3,12,16-21} Seven studies determined the risk of bottle feeding for severe, "significant," or recurrent otitis media and upper respiratory infection. Six of the seven found a significantly elevated risk for bottle-fed infants compared with breastfed infants. One study measured only first cases of acute otitis media as the outcome.³ That study found no elevated risk. Bottle-fed children got severely infected one to eight times more frequently than fully breastfed children.

Could factors other than bottle feeding be responsible for these elevated risks? No evidence was found for important confounding factors. Ellestad-Sayed et al¹⁷ found no dissimilarities between bottle-fed and breastfed groups in family size, number of occupants per house, family income, or parents' education. Saarinen¹⁹ found no dissimilarities in social background. Cunningham¹⁸ stratified by father's education, mother's age, older siblings, birth weight, and sex. In each stratum, episodes of illness remained significantly more frequent among bottle-fed children. Forman et al³ found no difference after adjusting for relevant risk factors. Teele et al¹² found socioeconomic status, number of siblings, smoking, and parental history had no effect. Taken as a whole, these data indicate that breastfeeding is protective; 6 months of breastfeeding appears optimal and 4 months of exclusive breastfeeding also offers protection.

No single ingredient of breast milk can be pinpointed for protecting the respiratory system from infection. The benefit is ascribed to various subtle and complex biochemical, immunologic, physiologic, and behavioural interactions that flow between mother and infant in the breastfeeding process.^{32,33}

Prevention

Enabling breastfeeding. Health and Welfare Canada's Medical Services Branch reported that 61% of Indian and Inuit infants in Canada were breastfed at birth (in 1988) and 42% at 3 months.³⁴ Only 31% were breastfed at 6 months. Examining how to support breastfeeding, Macaulay et al³⁵ surveyed 77 new mothers in the Mohawk community of Kahnawake, Que. Two thirds of the women had decided whether they would breastfeed before becoming pregnant. Those mothers who continued breastfeeding were strongly supported by the baby's father and by their own mothers. Macaulay et al³⁵ recommended that young people be educated about breastfeeding in school and that programs be targeted to the whole community, not just to pregnant women: We should "act as facilitators to assist the community to re-create a supportive environment for breastfeeding mothers."

Secondary prevention. Secondary prevention of learning deficits from extended periods of hearing loss is also important, but effective strategies were not located. Recent reviews do not recommend screening to detect middle ear disease and hearing loss in school-age children.^{36,37} Most episodes of otitis media resolve spontaneously in a few weeks. Repeated screenings would be necessary to detect the small group of children who might be at risk of learning disabilities because of persistent hearing loss over time. No evidence suggests that screening of First Nations children would be useful.

Jenkins³⁸ suggests that parents and teachers be encouraged to speak clearly and with understanding to children with fluctuating hearing loss. Children with temporary hearing loss might benefit from moving their desks closer to the teacher.

Evaluating treatment programs

Programs to treat First Nations people for otitis media have not proven successful. Sixteen years after the

CME

.....

Otitis media
How are First Nations
children affected?

US Public Health Service improved medical services in an Apache community, a follow-up study showed no decrease in clinically significant otitis media.² Similarly, treating Inuit children in two villages with long-acting penicillin injections made no difference in the incidence or prevalence of otitis media when compared with rates in

four other villages.³¹ According to Westwater et al,²⁸ "Although various treatment methods have been endorsed by different specialists" for Australian Aboriginals, "none seems to be successful." Manning might be right when he states that "control of this disease should be directed away from the middle ear and the organisms that invade it, and

Table 3. Effect of bottle feeding on risk of otitis media (OM) and upper respiratory infection (URI) compared with breastfeeding

LOCATION OF STUDY, AGE OF PATIENTS	DISEASE MEASURE*	FEEDING METHOD	DISEASE RATE	RELATIVE RISK† (95% CONFIDENCE INTERVAL)
Inuit in Canadian Arctic, all ages ¹⁶	Healed or persistent OM	Bottle	28/66	8.14 (4.93-13.46)
		Breast	21/403	Reference value
Reserve in Northern Manitoba, 0-1 y ¹⁷	Hospitalized for OM or URI	Bottle	12/107	5.38‡ (0.72-40.23)
		Breast	0/48	Reference value
Rural New York State, 0-1 y ¹⁸	Significant episode of OM	Bottle	182/384	2.46 (1.68-3.60)
		Breast >4 mo	23/119	Reference value
Helsinki, 0-1 y ¹⁹	Recurrent OM	Bottle (and breast <2 mo)	18/96	3.31 (1.02-10.73)
		Breast 2-6 mo	7/73	1.69 (0.46-6.25)
		Breast >6 mo	3/53	Reference value
Pima, Ariz, 0-1 y ³	First OM or URI	Bottle	246/300	1.09 (0.97-1.23)
		Breast <5 mo	134/159	1.12 (0.99-1.27)
		Breast >5 mo	84/112	Reference value
Finland, 0-2 y ²⁰	Recurrent OM	Bottle (and breast <3 mo)	§	
		Breast >3 mo	§	
Boston 0-1 y ¹²	Recurrent OM	Bottle	76/433	2.04 (1.09-3.81)
		Breast <6 mo	9/89	1.17 (0.50-2.76)
		Breast >6 mo	10/116	Reference value
Tuscon, 0-1 y ²¹	Recurrent OM	Bottle (and breast <4 mo)		
		Breast 4-6 mo		
		Breast >6 mo		

* Measured disease was, severe, "significant," or recurrent in all but Pima study.

† Risks for bottle-fed and partially breastfed groups were estimated relative to the most completely breastfed group.

‡ Relative risk was estimated using a 1/148 outcome for the breastfed group in place of the observed value of 0/48, giving a conservative value.

§ Numbers were not available. Relative risk for group weaned to bottle before 3 months was not significantly higher than 1.0.

|| Numbers were not available. Exclusive breastfeeding at least 4 months was significantly protective in a study of 1013 infants.

toward the total host, whose susceptibility is a key factor in this disease."¹³

Conclusion

Available data show that First Nations children are hospitalized six times more often for otitis media and five to nine times more often for upper respiratory infection than other children. Poor access to primary care could be a factor. However, the limited data show that First Nations children visit physicians for otitis media at least as often as other children. Medical treatment programs for otitis media have not been found effective for indigenous children.

Among British Columbia's First Nations children, severe otitis media appears a much less serious problem than it was several decades ago. The current high hospitalization rates might represent the end stage of an epidemic that was at its peak several decades ago during a period of cultural disintegration.

The ultimate aim of this review was to determine strategies for ameliorating the problem of severe otitis media among First Nations children. No simple answers were uncovered from the evidence; in fact the questions became more complex. It appears that actions to decrease the effect of severe otitis media should involve not only the total child, but also the child's environment and the beliefs and culture determining that environment. One avenue would be to support First Nations mothers to reestablish breastfeeding as the usual practice. ■

Acknowledgments

I thank Dr Stefan Grzybowski from the Queen Charlotte Islands Health Care Society Medical Clinic, Dr Isaac Sobol from the Nisga'a Valley Health Board in New Aiyansh, BC, and Dr Ann Macaulay from Kateri Memorial Hospital Centre at Kahnawake, QC, for their review of the manuscript and their encouragement. I also thank the medical Care Insurance and the Health Planning and Policy Development branches of Saskatchewan Health for providing data.

Requests for reprints to: Dr Molly Thomson, Research and Evaluation Branch,

Ministry of Health and Ministry Responsible for Seniors, 1515 Blanshard St, Victoria, BC V8W3C8

References

1. Eimas PD, Cavanaugh JF. Otitis media, hearing loss, and child development: a NICHD conference summary. *Public Health Rep* 1986;101:289-93.
2. Todd NW, Bowman CA. Otitis media at Canyon Day, Arizona. *Arch Otolaryngol* 1985;111:606-8.
3. Forman MR, Graubard BI, Hoffman HJ, Beren R, Harley EE, Bennett P. The Pima Infant Feeding Study: breast-feeding and respiratory infections during the first year of life. *Int J Epidemiol* 1984;13:447-53.
4. Curtis G, Russell T, Aitken J, Mihalyko J. *Current health resources, organization and utilization: a background report of the review of child and youth health services*. Saskatoon: Saskatchewan Health, 1980.
5. Evers SE, Rand CG. Morbidity in Canadian Indian and non-Indian children in the first year of life. *Can Med Assoc J* 1982;126:249-52.
6. Thomson M, Phillion J. Children's respiratory hospitalizations and air pollution. *Can J Public Health* 1991;82:203-4.
7. Cambon K, Galbraith JD, Kong G. Middle-ear disease in Indians of the Mount Currie Reservation, British Columbia. *Can Med Assoc J* 1965;93:1301-5.
8. Houston CS, Weiler RL, Habbick BF. Severity of lung disease in Indian children. *Can Med Assoc J* 1979;120:1116-21.
9. Thomson M, Phillion J. *Respiratory hospitalizations of children in pulp mill and non-pulp mill communities in British Columbia*. Unpublished Ministry of Health document, 1989.
10. Teele DW, Klein JO, Rosner B, the Greater Boston Otitis Media Study Group. Middle ear disease and the practice of pediatrics. *JAMA* 1983;249:1026-9.
11. Bluestone CD. Recent advances in pediatric otolaryngology. Modern management of otitis media. *Pediatr Clin North Am* 1989;36:1371-87.
12. Teele DW, Klein JO, Rosner B, the Greater Boston Otitis Media Study Group. Epidemiology of otitis media during the first seven years of life in children in Greater Boston: a prospective, cohort study. *J Infect Dis* 1989;160:83-94.

Otitis media
How are First Nations children affected?

13. Manning PJ. The nutritional basis of otitis media. In: Haworth JC, editor. *Nutrition of Indian and Eskimo children: report of the second Canadian Ross conference on pediatric research*. Quebec City: Ross Laboratories, 1975:151-4.
14. Baxter JD. An overview of twenty years of observation concerning etiology, prevalence, and evolution of otitis media and hearing loss among the Inuit in the Eastern Canadian Arctic. In: Postl BD, Gilbert G, Goodwill J, Moffatt MEK, O'Neil JD, Sarsfield PA, et al, editors. *Proceedings of 8th International Congress on Circumpolar Health*. Winnipeg: University of Manitoba Press, 1990:616-9.
15. Julien G, Baxter JD, Crago M, Ilecki HJ, Therien F. Chronic otitis media and hearing deficit among Native children of Kuujuaaraapik (Northern Quebec): a pilot project. *Can J Public Health* 1987;78:57-60.
16. Schaefer O. Otitis media and bottle-feeding: an epidemiological study of infant feeding habits and incidence of recurrent and chronic middle ear disease in Canadian Eskimos. *Can J Public Health* 1971;62:478-89.
17. Ellestad-Sayed J, Coodin FJ, Dilling LA, Haworth JC. Breast-feeding protects against infection in Indian infants. *Can Med Assoc J* 1979;120:295-8.
18. Cunningham AS. Morbidity in breast-fed and artificially fed infants. *J Pediatr* 1979;95:685-9.
19. Saarinen UM. Prolonged breast feeding as prophylaxis for recurrent otitis media. *Acta Paediatr Scand* 1982;71:567-71.
20. Tainio V-M, Savilahti E, Salmenpera L, Arjomaa P, Siimes MA, Perheentupa J. Risk factors for infantile recurrent otitis media: atopy but not type of feeding. *Pediatr Res* 1988;23:509-12.
21. Duncan B, Ey J, Holberg CJ, Wright AL, Martinez FD, Taussig LM. Exclusive breast-feeding for at least 4 months protects against otitis media. *Pediatr* 1993;91:867-71.
22. Dufour R. The search for the etiology of otitis media: results obtained with an application of the system theory. In: Postl BD, Gilbert G, Goodwill J, Moffatt MEK, O'Neil JD, Sarsfield PA, et al, editors. *Proceedings of 8th International Congress on Circumpolar Health*, Winnipeg: University of Manitoba Press, 1990:626-9.
23. Dufour R. Vers un diagnostic transculturel de l'otite moyenne. *Anthropol Soc* 1990;14:43-64.
24. Smith GW. A Middle East experience with chronic otitis media. *J Otolaryngol* 1990;19:377-8.
25. Stewart IF. Otolaryngology in the South Pacific. *J Otolaryngol* 1990;19:374-6.
26. Wilson J. Disability in Thailand. *J Otolaryngol* 1990;19:396-8.
27. Boon DAW. Otolaryngology in Nepal. *J Otolaryngol* 1990;19:372-3.
28. Westwater A, Rebgetz P, Douglas FP, Nienhuys TG, McConnel F, Mathews JD. Epidemiology of otitis media in aboriginal children in Australia. In: Postl BD, Gilbert G, Goodwill J, Moffatt MEK, O'Neil JD, Sarsfield PA, et al, editors. *Proceedings of 8th International Congress on Circumpolar Health*. Winnipeg: University of Manitoba Press, 1990:623-5.
29. Daly KA. Epidemiology of otitis media. *Otolaryngol Clin North Am* 1991;24:775-86.
30. Shaw JR, Todd NW, Goodwin MH, Feldman CM. Observations on the relation of environmental factors to the occurrence of otitis media among Indian children. *Public Health Rep* 1981;96:342-9.
31. Reed D, Dunn W. Epidemiologic studies of otitis media among Eskimo children. *Public Health Rep* 1970;85:699-706.
32. Cunningham AS, Jelliffe DB, Jelliffe EFP. Breast-feeding and health in the 1980s: a global epidemiologic review. *J Pediatr* 1991;118:659-65.
33. Graham NMH. The epidemiology of acute respiratory infections in children and adults: a global perspective. *Epidemiol Rev* 1990;12:149-78.
34. Langner N. *National database on breast-feeding among Indian and Inuit women: survey of infant feeding practices from birth to six months, Canada, 1988*. Ottawa: Health and Welfare Canada, 1990.
35. Macaulay AC, Hanusaik N, Beauvais JE. Breastfeeding in the Mohawk community of Kahnawake: revisited and redefined. *Can J Public Health* 1989;80:177-81.
36. Cross AW. Health screening in schools. Part I. *J Pediatr* 1985;107:487-94.
37. Bluestone CD, Fria TJ, Arjona SK, Casselbrant ML, Schwartz DM, Ruben RJ, et al. Controversies in screening for middle ear disease and hearing loss in children. *Pediatrics* 1986;77:57-70.
38. Jenkins JJ. Cognitive development in children with recurrent otitis media: where do we stand? In: Kavanagh JF, editor. *Otitis media and child development*. Parkton, Md: York Press, 1986:211-21.