Morbidity and Mortality Rates in a Nova Scotia First Nations Community, 1996-1999

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ABSTRACT

Background: Despite an abundance of data and analysis of First Nations morbidity and mortality rates, accurate data have not been available to serve the First Nations community in Eastern Canada.

Methods: Data for Eskasoni, the largest Mi'kmaq community, were obtained for 1996 through 1999 and Cape Breton and Nova Scotia were used as regional and provincial reference populations respectively. Age-adjusted relative risks (AARR) were calculated for overall mortality and disease-specific hospital admissions.

Results: Eskasoni's mortality AARR was greater than 1.0 in 3 of the 4 years studied, although the data may understate Eskasoni's mortality rates. Eskasoni's total admission AARRs were significantly greater than the two reference populations. Neoplasm admission rates were generally lower, while circulatory disease admission AARRs were significantly higher. A rise in diabetic admission rates was noted with the AARR reaching statistical significance in the final years of the study. Respiratory disease was the leading cause of hospitalization with significantly greater rates of admission than regional or provincial rates. Pneumonia and influenza accounted for more than one half of respiratory admissions. Infectious disease admissions were more prevalent in Eskasoni while rates of liver disease were generally low.

Conclusion: Results suggest that members of the largest Mi'kmaq band are at greater risk for a number of disease categories and health promotion should be targeted toward respiratory ailments, circulatory disease and diabetic management. Further analysis, however, remains an important priority.

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

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It is well established that the average life expectancy of Canadian First Nations people is lower than that of their fellow Canadians, and that First Nations communities sustain a disproportionate share of the burden of illness.[1,2] Studies have identified the major causes of morbidity and mortality among Aboriginal peoples.[1,3-6] Thus the role of further research to identify ill health within Canada's First Nations has been questioned.[7] However, accurate data have not been analyzed in Atlantic Canada.

A lack of accurate data was acknowledged in a 1986 study that excluded New Brunswick and Newfoundland due to inadequate data collection. Furthermore it was concluded that First Nations mortality rates calculated for Nova Scotia were unreliable.[3] With perceived deficiencies in death certificate coding, subsequent studies excluded Atlantic Canadian provinces.[4,5] This study attempts to remedy a portion of this deficit.

The First Nations of Atlantic Canada include the Malicite and Mi'kmaq nations. The Mi'kmaq Nation is spread across Nova Scotia, New Brunswick and Prince Edward Island as well as the Gaspé region of Quebec, the western coast of Newfoundland, and the state of Maine. The Mi'kmaq population of Nova Scotia is approximately 11,000 people, representing 1.2% of the population. Eskasoni, located on the East Bay shores of the Bras d'Or Lakes in Cape Breton, is the largest band of the Mi'kmaq Nation. The band membership in 1999 was 2,766.

The 1996 to 1999 study period reflects a time of transition in Eskasoni with the transfer of responsibility for health care services from Health Canada to the band council in 1997 and the subsequent development of a new model of primary health care. This study was established to assist in the delivery of health promotion and disease prevention at a time of changing medical practice within Eskasoni. Furthermore, the necessity of this study is clear given the lack of previous valid analyses, and Eskasoni may serve as a representative Atlantic Canadian Aboriginal community. A longitudinal database was prepared by Dalhousie University's Population Health Research Unit (PHRU) in partnership with the Eskasoni Community Health Board (ECHB).[8] This analysis of data provides mortality rates and disease-specific

hospitalization age-adjusted relative risks (AARR).

METHODS

Ethics approval was granted by the Dalhousie Health Sciences Ethics Review Board. Eskasoni's demographic data for 1996 through 1999 were obtained by PHRU using the band registrant data according to fiscal year. Cape Breton and Nova Scotia served as regional and provincial reference populations respectively. The Cape Breton population included the counties of Cape Breton, Richmond, Inverness and Victoria. Statistics Canada catalogues provided annual demographic statistics of populations by age group from 1996 through 1999. Age distributions were determined for the three populations. They were grouped according to eight age categories; 0-9, 10-19, 20-29, 30-39, 40-49, 50-59, 60-69 and ≥70 years.

Vital Statistics data were accessed with health care numbers, postal codes and geocodes as identifiers. Eskasoni and reference population mortality rates were calculated for the years 1996 through 1999. Rates were adjusted for age and relative risks were calculated. As earlier studies have raised concerns about the accuracy of the Vital Statistics data,[3-5] 1998 and 1999 ECHB data were obtained for comparison. Whereas Vital Statistics mortality data rely on the identification of death certificate coding by Statistics Canada, the ECHB data were collected at a grassroots level and rely simply on the documentation of a death within the community by a group of community members, i.e., the community health board.

To assess morbidity, the Canadian Institute for Health Information (CIHI) physician billing data were accessed by PHRU. Using ICD-9 codes[9] and health care numbers as identifiers, disease-specific admissions to Nova Scotia hospitals from 1996 to 1999 were obtained for Eskasoni and the reference populations. Disease categories were chosen based on patterns of illness identified in previous studies of Aboriginal populations.[1,4-6]

Total admission and disease-specific admission rates were calculated. Crude rates were adjusted for age using the method of direct standardization.[10] From these age-standardized admission rates (ASAR), the Eskasoni AARRs were calculated with reference to both Cape Breton and Nova Scotia. Group differences were tested using the chi-square test and a p-value less than 0.05 was considered statistically significant.

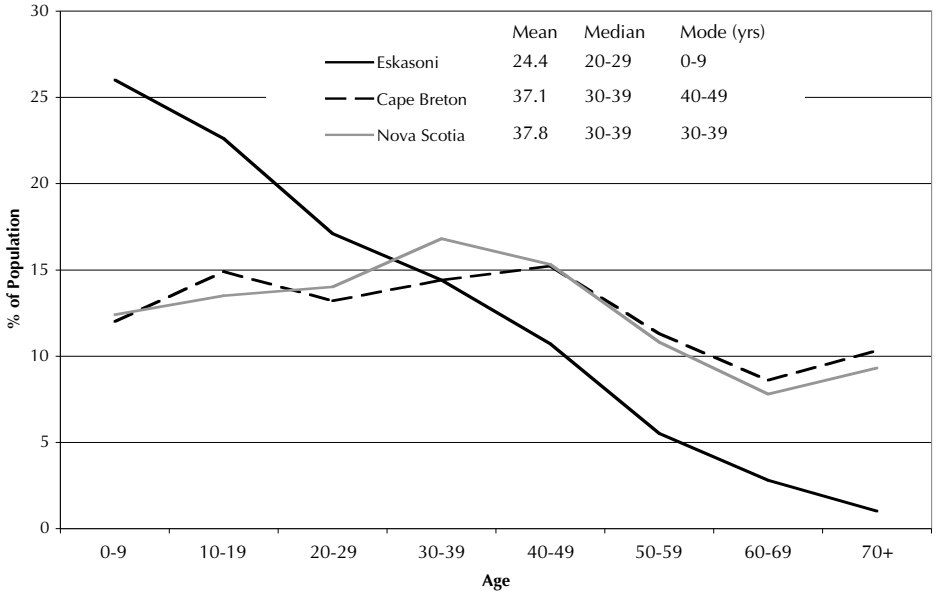

Figure 1. Age distribution for 1996 through 1999

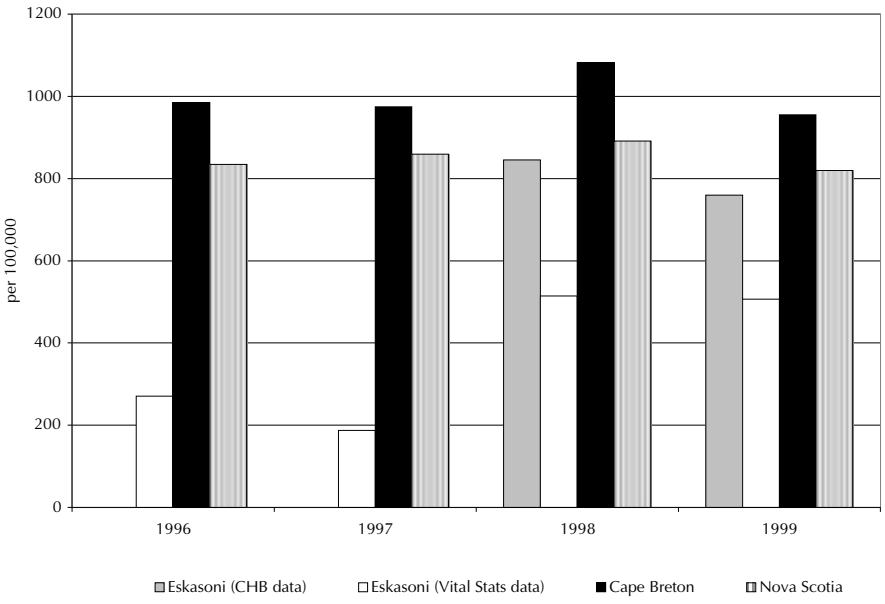

Figure 2. Crude mortality rates for 1996 through 1999

RESULTS

Age distribution

Figure 1 shows the age distributions during the study period (1996 through 1999). Eskasoni's population is younger in all three measures of mean, median and mode. Only 3.8% of Eskasoni's population was 60 years of age or older, in contrast with 18.9% in Cape Breton and 17.1% in Nova Scotia. These notable differences highlight the necessity of comparing age-adjusted rates.

Mortality

Figure 2 shows crude mortality rates for Eskasoni, Cape Breton and Nova Scotia. This figure also compares Vital Statistics data with ECHB data for 1998 and 1999. The Vital Statistics data show lower crude mortality rates among the residents of

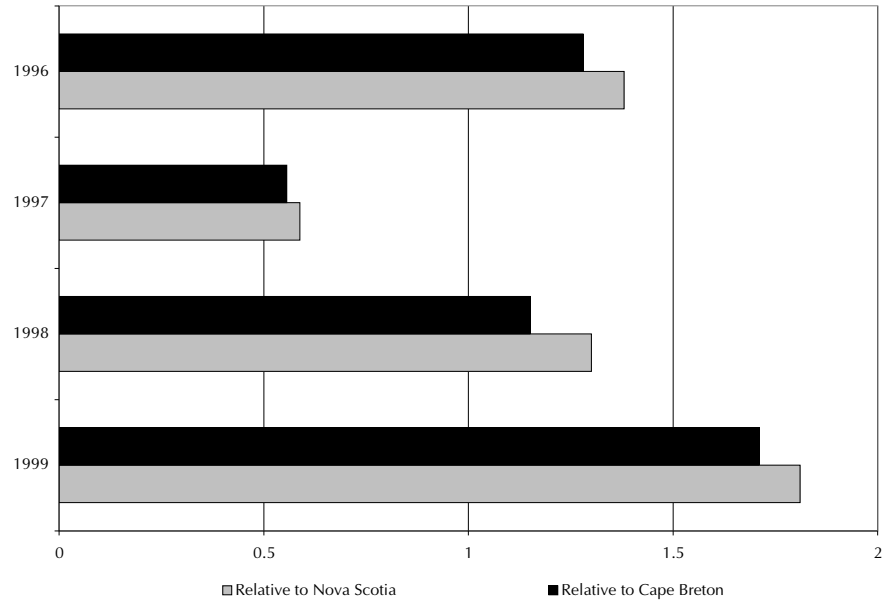

Figure 3. Total mortality age-adjusted relative risk (Vital Statistics data) for 1996 through 1999

TABLE I

Age-standardized Admission Rates per 100,000 and Eskasoni Age-adjusted Relative Risks with Cape Breton as the Reference Population

Admissions		Eskasoni	Cape Breton	AARR	P value
Total	1996	26480	24288	1.09	0.097
Admissions	1997	27793	24223	1.15	0.006*
	1998	29405	24464	1.20	<0.001*
	1999	30231	24490	1.23	<0.001*
Circulatory	1996	2039	2557	0.80	0.490
ICD-9 390-459	1997	4051	2526	1.60	0.043*
	1998	6977	2590	2.69	<0.001*
	1999	5063	2645	1.91	<0.001*
Neoplasm	1996	580	1804	0.32	0.039*
ICD-9 149-239	1997	424	1730	0.25	0.025*
	1998	1309	1976	0.66	0.280
	1999	2425	2173	1.12	0.674
Diabetes	1996	310	181	1.71	0.472
ICD-9 250	1997	450	167	2.69	0.116
	1998	604	171	3.53	0.019*
	1999	742	152	4.88	<0.001*
Respiratory	1996	2894	1699	1.70	0.012*
ICD-9 460-519	1997	2433	1703	1.43	0.174
	1998	3841	1766	2.17	<0.001*
	1999	3141	1608	1.95	0.002*
Pneumonia	1996	1753	402	4.36	<0.001*
& Influenza	1997	1013	406	2.50	0.055
ICD-9 480-487	1998	2142	494	4.34	<0.001*
	1999	1609	393	4.09	<0.001*
Infectious	1996	582	223	2.61	0.020*
Disease	1997	149	257	0.58	0.497
ICD-9 001-139	1998	619	232	2.67	0.024*
	1999	391	203	1.93	0.208
Liver	1996	42	61	0.70	0.849
Disease	1997	81	57	1.42	0.803
ICD-9 570-574	1998	0	50	0	0.567
	1999	23	61	0.37	0.682

* Statistically significant with p<0.05 using a two-sided t-test

Eskasoni, than the ECHB data. Vital Statistics data acknowledge 14 deaths in a population of 2,723 in 1998 and 14 deaths in a population of 2,766 in 1999; in comparison, the ECHB data recognize 23 and 21 deaths in 1998 and 1999 respectively. In relation to the ECHB data, one third of deaths do not appear in the Vital Statistics data. Using the lower crude mortality rates of the Vital Statistics data, Figure 3 shows the mortality AARR to be greater than 1.0 in three of four years and as high as 1.81 relative to Nova Scotia in 1999.

Morbidity – Total admissions

Tables I and II demonstrate Eskasoni's ASARs per 100,000 and AARRs in relation to the regional and provincial reference populations. Total admission ASARs were significantly greater in Eskasoni and time trends reveal an annual incremental rise in the Eskasoni rates.

Disease-specific admissions

Circulatory disease AARRs were significantly higher in Eskasoni with the ASAR tripling from 1996 to 1998. Neoplasm ASARs were generally lower, though they surpassed the reference populations in 1999. Eskasoni experienced a substantial rise in the rate of hospital admissions due to diabetes as the AARR reached statistical significance in 1998 and 1999. Respiratory disease was the leading cause of hospitalization in Eskasoni with a significantly elevated AARR in each year of the study, with the exception of 1997, relative to Cape Breton. Pneumonia and influenza accounted for more than one half of respiratory admissions with ASARs consistently four times greater than those of Cape Breton and up to five times greater than those of Nova Scotia, except in 1997. Infectious illness was also more prevalent in Eskasoni with the AARR greater than 1.0 in 3 of 4 years. Eskasoni's rates of liver disease were generally low

DISCUSSION

Over recent decades, the life expectancy of Aboriginal peoples across Canada has improved greatly. This is largely attributed to the decline in neonatal and postneonatal mortality.[5] Nonetheless, mortality rates remain high compared to those of the Canadian general population.[1,2,11] Aboriginal adult mortality rates have also declined. A comparison of rates from 1979-83 and 1984-88 among Canadian Aboriginals living on reserves demonstrated that mortality rates had dropped by 17%. However, these rates were still twice

those of their Atlantic Canadian counterparts.[4] In this study, the accuracy of the mortality data remains unclear, although the data suggest a high relative risk of mortality among residents of Eskasoni during the study period 1996 through 1999.

As a reflection of morbidity, admission rates remained fairly constant among the reference populations throughout the study period. However, Eskasoni total admission ASARs increased each year and were significantly higher than those of the reference populations. It is important to recognize, however, that these increasing admission rates are observed during a time of health care transition within the Eskasoni community.

A major cause of morbidity and mortality, circulatory disease is the leading cause of hospitalization and death in Canada.[12] It has also been shown to be the leading cause of death among Aboriginals in Canada and the United States.[3,6] Studies have generally shown no difference or decreased rates of circulatory disease mortality within Native populations.[13-15] In the three final years of this study, circulatory disease ASARs were significantly greater in Eskasoni compared to those of the reference populations.

Cancer is the second leading cause of death among the Canadian population.[12] Furthermore, Nova Scotia has the highest rates of cancer in Canada, and Cape Breton has the highest rates in Nova Scotia.[16] However, studies have observed lower rates of cancer within Aboriginal populations.[6,17] This study also identified low rates of neoplasm among band members of the Eskasoni First Nation, though age-standardized admission rates were seen to climb in the latter years. While reference rates increased during the study, Eskasoni's ASARs increased at a greater rate.

Diabetes is one of the most urgent issues facing the Aboriginal population. In 1991, 6% of the Canadian Aboriginal population reported having diabetes compared to 2% of the general population.[1] The condition affects one quarter of Aboriginal people over 45 years.[18] With an age-standardized prevalence of 8.7%, Atlantic Canada has the highest rates of diabetes among Aboriginal people in Canada.[19] This study also reveals high rates and a dramatic rise during the study period. A diabetes clinic and treatment program established in Eskasoni in 1996, coupled with the new model of primary care, may account for an increased awareness and active treatment of diabetic complications at this time. The genetic disposition towards diabetes among the Aboriginal population is disputed,[18] thus the importance of traditional lifestyle must be highlighted.

TABLE II

Age-standardized Admission Rates per 100,000 and Eskasoni Age-adjusted Relative Risks with Nova Scotia as the Reference Population

Admissions		Eskasoni	Cape Breton	AARR	P value
Total Admissions	1996	26527	20483	1.30	<0.001*
	1997	27496	20315	1.35	<0.001*
	1998	28824	20910	1.38	<0.001*
	1999	29347	20951	1.40	<0.001*
Circulatory ICD-9 390-459	1996	1917	2120	0.90	0.779
	1997	3752	2096	1.79	0.011*
	1998	6470	2094	3.09	<0.001*
	1999	4709	2075	2.27	<0.001*
Neoplasm ICD-9 149-239	1996	561	1508	0.37	0.077
	1997	420	1604	0.26	0.024
	1998	1213	1805	0.67	0.280
	1999	2185	1870	1.17	0.542
Diabetes ICD-9 250	1996	314	147	2.14	0.497
	1997	425	149	2.85	0.072
	1998	617	145	4.26	0.002*
	1999	685	144	4.76	<0.001*
Respiratory ICD-9 460-519	1996	2796	1371	2.04	<0.001*
	1997	2320	1352	1.72	0.031*
	1998	3669	1407	2.61	<0.001*
	1999	2959	1335	2.22	<0.001*
Pneumonia & Influenza ICD-9 480-487	1996	1620	320	5.06	<0.001*
	1997	954	332	2.87	0.021*
	1998	1972	336	5.07	<0.001*
	1999	1474	337	4.37	<0.001*
Infectious Disease ICD-9 001-139	1996	581	212	2.74	0.018*
	1997	155	209	0.74	0.726
	1998	606	196	3.09	0.006*
	1999	431	185	2.33	0.070
Liver Disease ICD-9 570-574	1996	48	40	1.21	0.912
	1997	94	41	2.28	0.478
	1998	0	45	0	0.555
	1999	21	50	0.43	0.589

* Statistically significant with $p<0.05$ using a two-sided t-test

Within the category of respiratory disease, the predominant ailments include COPD, asthma and infection. Although asthma had been reported as being rare among Aboriginals prior to 1975,[20,21] increasing rates have been noted.[22,23] Respiratory disease was the leading cause of hospitalization in Eskasoni from 1996 to 1999 with ASARs significantly higher than in the reference populations. The non-traditional use of tobacco must be considered as an important factor. A 1997 health survey carried out by the Union of Nova Scotia Indians and the Confederacy of Mainland Micmacs reported that 64% of adult females and 58% of adult males smoke cigarettes.[24] A high prevalence of cigarette smoking has been noted among American Indians in areas with high mortality and hospitalization due to respiratory disease.[23] Furthermore the incidence of pneumonia and bronchitis is higher among children of parents who smoke.[25-27]

A subcategory of respiratory disease, pneumonia and influenza is of specific concern, reported as the sixth leading cause of death among American Indians from 1980 to 1986.[23] This population was shown to have 50% excess in pneumonia/influenza mortality from 1991 to 1993.[6] Other studies have also noted increased incidence and mortality.[3,28] There is also evidence that Native children suffer from respiratory tract infections with increased rates and severity.[5,28-31] More than half of Eskasoni's respiratory admissions were due to pneumonia and influenza as compared to one quarter among the reference populations.

Multiple studies have recognized increased risk of infectious diseases within the Aboriginal population.[32-37] A secondary

data analysis of hospitalization among an Albertan Blood Indian Band revealed infectious disease admission rates greater than 4 times the provincial rate,[38] whereas Eskasoni's ASARs were generally 2 to 3 times greater than those of the reference populations.

High rates of liver disease have been reported within Native communities.[3,4,13,39,40] From 1991 to 1993, liver disease was the fifth leading cause of death among American Aboriginals.[6] However, Eskasoni's liver disease ASARs were generally low and in 1998 there were no admissions. Yet, this category is problematic given the extremely small numbers involved. Nonetheless, this demonstrates that despite a largely shared history and heritage, broad generalizations should not be made about all First Nations communities. Each nation is unique and each community within a nation has its own distinctive characteristics.

Thus, seven years ago, it was proclaimed that sufficient studies of Aboriginal health have been conducted and it is time to act.[7] However, in Atlantic Canada we have demonstrated a discrepancy between the Vital Statistics mortality data and data gathered by the ECHB. This is consistent with the findings of previous authors.[3-5]

It appears that the data obtained through CIHI physician claims provide an accurate description of morbidity. However, this should only be interpreted as a measure of required admissions to hospital due to specific diseases, not as a direct reflection of disease incidence. Additionally, it should be noted that while CIHI data in this study provide disease-specific hospital admissions, data do not factor in multiple admissions by one individual, co-morbidities for which there is no admission, nor variable access to health care. Furthermore, the data reflect a time of changing medical practices and referral patterns. It is speculated by the authors that the latter years of the study may represent a time of increased access to health care and thus may provide a more accurate reflection of morbidity within the community.

It is concluded that health promotion should be targeted toward respiratory ailments, circulatory disease and diabetes prevention and management. Yet with years of development since the transition to the new model of primary care in Eskasoni, analysis of current data may be more meaningful. In addition, analysis of injury-related admission data is not included in this study and is of extreme importance. Motor vehicle accidents alone were the second leading cause of death on Canadian Indian reserves from 1977 to 1982.[3] Accidents were the third leading cause of death among American Aboriginals from 1991-1993.[6] A review of mortality and hospitalization rates among the younger age groups is also critical, particularly among neonates and infants.[5,41] Future analysis with gender breakdown also remains an important priority.

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RÉSUMÉ

Contexte : En dépit d'une abondance de données et d'analysation de morbidité et des taux de mortalité des Premières Nations, les données précises n'ont pas été disponibles pour servir les communautés de Première Nations dans l´est du Canada.

Méthodes : Des données pour Eskasoni, la plus grande communauté de Mi'kmaq, ont été obtenues pour les années 1996 à 1999 et Cape Bréton et la Nouvelle-Écosse ont été employés respectivement comme populations de référence régionale et provinciale. Les risques relatifs ajustés pour l'âge (RRAA) ont été calculés pour des admissions d'hôpital spécifiquement pour les taux de mortalité et de maladie.

Résultats : La mortalité RRAA d'Eskasoni était 1,0 dans 3 des 4 années étudiées, quoique les données ont la possibilité d'amoindrir la mortalité d'Eskasoni. Les RRAA d'admission d'Eskasoni étaient sensiblement plus grands que les populations de référence. Les taux d'admission de néoplasme étaient généralement inférieurs, alors que les RRAA d´admission de la maladie circulatoires étaient sensiblement plus hauts. Une élévation des taux d'admission diabétiques a été notée avec les RRAA atteignant la signification statistique en années finales de l'étude. La maladie respiratoire était la principale cause de l'hospitalisation avec des taux d'admission sensiblement plus grands. La pneumonie et la grippe ont constitué plus d'une moitié des admissions respiratoires. Les admissions infectieuses de la maladie étaient plus répandues dans Eskasoni tandis que les taux d'infection hépatique étaient généralement bas.

Conclusions : Les résultats suggèrent que les membres de la plus grande bande de Mi'kmaq soient à un plus grand risque pour un certain nombre de catégories de la maladie et la promotion de santé devrait être visée vers la maladie respiratoire et la gestion diabétique. Plus d'analysation demeure une priorité importante.