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Suicide in Inuit Nunaat: An analysis of Suicide Rates and the effect of Community-level Factors

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Introduction

Suicide is one of the areas of greatest concern to Inuit living in Canada's north, yet there is little in the way of national statistical evidence to highlight this issue. Besides trying to come to grips with the scope of the issue, Inuit, along with Federal, Provincial and Territorial governments, are trying to understand the factors that lead people to take their own lives, in an attempt to formulate more effective suicide prevention strategies. In this study, we look at suicide in Inuit Nunaat (land where Inuit live) through a geographical approach, in the absence of Inuit identifiers in national vital statistics datasets. Furthermore, we analyse these data using information from the Statistics Canada's Census of Population and Aboriginal Peoples Survey to compare suicide rates between groups of communities based on a variety of community-level factors.

Background

Inuit live primarily in remote, northern communities in regions across Canada's north known collectively as Inuit Nunaat. In 2001, there were some 45,000 Inuit in Canada according to the Census, most of whom lived in one of 53 communities in four regions: Inuvialuit in the Northwest territories, the Territory of Nunavut, Nunavik, in northern Quebec, and Nunatsiavut, on the north coast of Labrador. All four of these regions have settled land claims, and three have formal agreements for Inuit-controlled government.

Suicide is a major problem among Inuit in Canada, with rates far above the national average. Among Nunavut residents, fully 22% of *all* the deaths that occurred between 2000 and 2003 were suicides [Hicks 2005]. Despite this, there is no consistent measurement of suicide rates across the four regions inhabited by Inuit, owing largely to the difficulty of separating the mortality data for Inuit from those of non-Inuit residents of the same areas. To monitor suicide rates, some Inuit regions are able to obtain information from coroners' reports; others rely on geography-based methods or simply on local knowledge to produce suicide statistics. The result has been that while some regions have comprehensive statistics on suicides, others have only basic or sporadic information. These differences in surveillance make it difficult to produce a national suicide rate, or compare mortality patterns across regions.

Recent research shows that suicide rates among Inuit in Canada are much higher than average. Various regional studies have found rates from around 3.5 to 11 times higher than the national average [Royal Commission 1995; Hicks 2007a; Bobet 2004]. Hicks [2006] and Boothroyd, *et al.* [2001] have also reported that suicide rates in at least two regions have increased during the late 1980s and 1990s.

Suicides tend to cluster in time and space, such that some communities may have serious problems while others experience few or no suicides [Henderson 2003]. Young males make up the largest proportion of Inuit suicides; studies have shown that males make up over 80% of Inuit suicides, and about 70% of all suicide victims were under 25 years of age [Hicks 2007a; Boothroyd, *et al.* 2001].

Indian and Northern Affairs Canada, in conjunction with Health Canada and Statistics Canada, explored the feasibility of producing suicide statistics for Inuit-inhabited regions of Canada, following the methodology developed by Wilkins, *et al.* [2008]. This method uses a geographic coding methodology to calculate statistics for communities that have a high proportion of Inuit residents, as identified from the Census of Population, conducted by Statistics Canada.

Following the calculation of suicide rates for the period from 1989 to 2003, we analyzed the findings by comparing rates for various socio-demographic and cultural indicators from the Census and the companion Aboriginal Peoples Survey (APS). This was facilitated by the fact that the geographic coding used to calculate suicide rates is the same as that used for the Census and APS, enabling us to compare suicide rates between groups of communities divided by differences in socio-cultural characteristics.

Risk Factors and the Explanation of High Suicide Rates

Risk factors for Inuit suicide might be divided into to general categories: mainstream risk factors that tend to be prevalent in Inuit society, and risk factors specific to Inuit (or at least Aboriginal) populations, such as colonization and acculturation.

Mainstream, or "standard" risk factors prevalent in Inuit communities include childhood separation and loss, alcohol abuse, personal mental health problems, domestic dysfunction and exposure to other peoples self-destructive behaviour [Boothroyd, *et al.* 2001].

Besides these factors, many researchers point to the rapid social and cultural change, social and economic marginalization, cultural suppression, political disempowerment and discrimination that come with a history of colonization and acculturation by western European powers as risk factors specific to Inuit [Boothroyd, *et al.* 2001; Kirmayer, *et al.* 2000]. Researchers link this loss of culture and its accompanying negative effects with loss of individual self-esteem, ultimately leading to disconnect with an individuals' culture and community to the point where life can be seen as meaningless and therefore disposable [Chandler and Proulx 2006]. The effect of cultural change may also explain the higher rates of suicide among males, where some have suggested that the traditional domestic role of women is more easily transferred to the modern wage-based service economy, than the male role of hunting and fishing [Henderson 2003; Advisory Group 2003; Hunter and Milroy 2006].

Recently, researchers have been investigating the link between community characteristics and suicide rates. Chandler and Lalonde [1998] noted that suicide in a group of First Nations communities in British Columbia varied wildly, where some communities had many more suicides than expected, while other communities had no suicides during the study period. The authors observed that suicide was much less common in First Nation communities that had cultural facilities, that managed their own health, education and police services, and that were actively pursuing control of their own lands. The more of these factors were present, the lower a community's suicide rate. The authors considered

these factors indicators of "cultural continuity", though they might just as easily be considered indicators of the degree to which a community controls its own affairs, and hence its destiny.

Although the Chandler and Lalonde findings have helped shift the discussion to one of community characteristics and the local environment, it is not clear to what degree this paradigm applies to Inuit communities. All of the Inuit regions have settled land claims, some dating back as far as 1976, and retention of traditional language is strong, with Inuit languages remaining dominant in some regions, especially Nunavik and Nunavut. In addition, most Inuit regions now have a substantial amount of local government[1] (although this is a recent development in most cases). These factors would lead us to predict low suicide rates based on Chandler and Lalonde's findings, yet, as we will see below, the Inuit rates are far above Canadian levels, and rising.

One recent theory contends that suicide in Inuit communities can be linked with active colonialism (i.e. not simply contact, but an overt, deliberate effort to 'modernize' Inuit communities) [Hicks 2007b]. Suicide rates seem to rise in the generation of Inuit born as this 'active colonialism' begins, when culture is in flux, and young Inuit are caught between a traditional and the modern. As Hicks states:

> The young Inuit men at greatest risk appear to be those who are situated somewhere between the historical Inuit "life script" and the emerging urban Inuit "life script", in communities and families where unemployment and social dysfunction are more common [Hicks 2007b].

Suicide in this scenario comes not from the loss of traditional culture directly, but from a situation where an inability to cope with the change itself, where young people of the current generation live in a world in transition, leaves them insufficiently grounded in either cultural tradition. Such disconnect can also be exacerbated by a domestic situation where parents have difficulties adapting to change. This creates a situation where younger Inuit feel connected neither to their past nor to the future.

The Geozone Methodology

The methodology for extracting vital statistics for Inuit-inhabited areas was developed and described by Wilkins, *et al.* [2008]. Most Inuit live in one of four regions in Northern Canada. These regions fall under four separate jurisdictions with varying capacity and methodology in collecting vital statistics. Inuit therefore cannot be routinely identified in mortality records across Canada, which makes it difficult to carry out routine surveillance of suicide trends. However, most Inuit live in isolated northern communities that can be identified by geographic codes present on the vital statistics records of all provinces and territories. This coding reflects the person's usual place of residence, rather than where

[1] Nunatsiavut (Labrador) has had formal-recognized local government since Dec 1, 2005, and has had substantial Inuit influence through institutions such as the Labrador Inuit Health Commission for many years before that; Nunavik has had Inuit regional government since the James Bay and Northern Quebec Agreement of 1976; while the Government of Nunavut officially came into being on April 1, 1999.

the death occurred. This fact makes it possible to produce routine surveillance data for Inuit-inhabited areas – that is, for all residents of communities that have substantial Inuit populations, regardless of the place of occurrence of the death.

To determine Inuit-inhabited communities, we used a cut-off of 33% Inuit inhabitants according to the 2001 Census of Population, following Wilkins *et al.* [2008]. While this sounds low, most communities above this cut-off had a much higher proportion of Inuit inhabitants, and it included all 53 communities within the Inuit land claim areas.[2] The final list included

- 6 communities in the Inuvialuit Settlement Region;
- 28 communities in Nunavut (plus 2 "unorganized areas" around the communities that shared the same postal codes);
- 14 communities in Nunavik;
- 6 communities in Labrador/Nunatsiavut.

In the parts of the study that involved combining mortality data with explanatory variables from the Aboriginal Peoples Survey (APS), this list had to be reduced slightly, since five of these communities were missing from the APS sample.

As a consequence of using a geographic-based approach, about 21 % of the total population covered is non-Inuit, though this proportion varies from region to region (see Table 1).

Table 1 Inuit-inhabited areas, 1996[1] population by stated identity

	Inuit single-identity		All other identities		Total
	Number	%	Number	%	Pop'n
Nunatsiavut (Lab)	2,309	68.1	1,080	31.9	3,389
Nunavik (Que)	7,628	88.0	1,069	12.0	8,697
Nunavut	20,489	83.1	4,176	16.9	24,665
Inuvialuit (NWT)	3,199	55.5	2,561	44.5	5,760
Total	33,625	79.1	8,886	20.9	42,511

[1] The 1996 Census count is the mid-point of the time-period covered in this study.

Most non-Inuit living in the North tend to be better educated, employed, paid and housed than their Inuit neighbours (see Table 2). It would be expected that the non-Inuit population would also have better health outcomes than the local Inuit population. Hicks [2007a] reported that of 221 suicides in Nunavut from 1999 to 2006, only 3 involved non-Inuit. As a result of this, we believe that our estimates of suicide rates in these communities are conservative, and underestimate the actual Inuit suicide rates. Additionally, this geographic method misses about 20% of the Inuit population, who live outside of the land claim areas.

[2] The 33% cut-off also let to the inclusion of one community, Northwest River, NL, from outside of the Inuit land claim areas.

Table 2 Population characteristics compared: Canada, Inuit-inhabited areas, and Inuit living in Inuit areas, 2001 Census data

Characteristic	Canada	Inuit-inhabited areas	Inuit-identity pop'n of these areas (single or multiple identity)
% under 15 years	19.4	36.6	40.3
% < high school diploma	31.1	51.4	62.0
% with some university	25.8	12.2	3.2
% unemployed	7.3	16.9	22.4
Avg household size	3.6	5.1	5.4
Avg income per person	$23K	$15K	$11K
Reproduced from Wilkins *et al.* 2007			

Against these limitations, the method has a number of strengths. It covers nearly 80% of the Inuit population without requiring identification of specific individuals as Inuit, and since vital statistics data are routinely compiled, the data are available for years into the past and are likely to be equally available in future, without the costs involved in mounting a separate data-collection exercise. Importantly, the geographic coding is standard enough that the same method can be applied to many other datasets—allowing analytical projects like the current one to combine mortality figures with data from other sources such as the Census and various surveys. In short, although the method does not remove the need for more rigorous ways of studying Inuit health, it does provide a means of routinely tracking mortality rates over time, is cost-effective, and opens up many possibilities for analytical studies.

Methods for the analytical portion of the study

In the analytical portion of this study, we grouped communities according to explanatory variables, and then calculated suicide rates for these groupings. For example, we compared suicide rates in the group of communities in which school attendance was high to rates in the group of communities where attendance was low. The explanatory variables were drawn from two sources: the 1996 Census and the 2001 Aboriginal Peoples Survey (APS). The choice of variables was based on the literature and influenced by whether or not the variable was available on the Census or APS. The final list included basic socio-demographic variables (community size, identity, employment, education), measures of tradition and language, and measures of community function and well-being.

The data covered the 15 years from 1989 to 2003, with all suicide rates standardized to the age distribution of the Inuit population in 2001. Census data on community characteristics were drawn from the 1996 Census, since 1996 represents the midpoint of the 15-year period studied. There was no Aboriginal Peoples Survey in 1996, but the

2001 version contained an Arctic Supplement that provided valuable information on participation in traditional activities and related aspects.[3] In both cases, data were extracted for the population who reported Inuit identity. This means that although the suicide rates are for the entire population, both Inuit and non-Inuit, of the selected communities, the explanatory variables are based only on people who identified as Inuit. The rationale for this decision is that the purpose of the analysis was to identify possible explanatory variables for Inuit suicide rates, since other sources suggest that up to 98% of the suicides in these areas are among Inuit.

Since the absolute numbers of suicides involved are fairly small, the explanatory variables were simply dichotomized, in order to preserve confidentiality. For purposes of this analysis, we compared communities that were notably "strong" on a given characteristic to all the remaining ones, rather than dividing at some point such as the median. Thus we typically compared communities in the top quartile (e.g., the quarter that had the highest proportions of youth in school) to the communities in the remaining three quarters. Some exceptions were made if there was an analytical reason to cut at a different point, or if cutting at the top quartile resulted in too small a group. Appendix 1 lists the cut points that were used for the different explanatory variables.

Patterns of suicide in Inuit-inhabited areas

Even if slightly understated, the area-based figures still show that the Inuit suicide rate is many times the Canadian average, at 112 per 100,000 from 1999 to 2003. One strength of the method is that it provides a consistent methodology for all four regions. As seen in Table 3 below, suicide rates are highest in Nunavik, followed by Nunatsiavut, Nunavut and then the Inuvialuit Settlement Area. Rates in Nunavik are significantly higher than the average for the four Inuit regions, and also higher than Nunavut. The remaining differences between regions do not reach statistical significance.

A look at the trends over time confirms for all four Inuit-inhabited areas what studies in Nunavut and Nunavik had already observed: suicide rates have increased over the past 15 years. Judging by the figures for all regions combined, the increase from the 1994 to 1998 to the 1999 to 2003 period was particularly pronounced. Increases in Nunavik and Nunavut over these periods were statistically significant, while all four regions saw statistically significant increases over the entire 15 year period.

[3] The 2001 APS sample contained some 10,755 Inuit, of whom 8,943 responded to the survey, for a response rate of 83%. [Statistics Canada 2003]

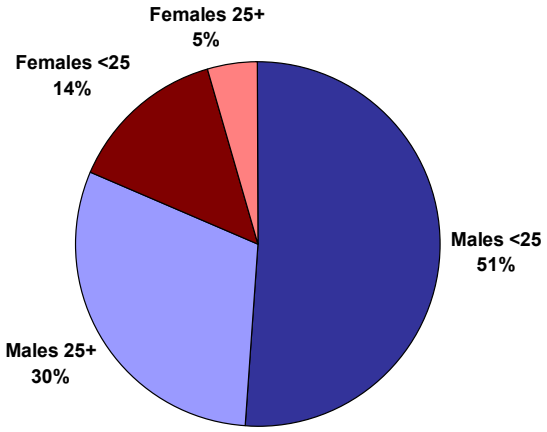
Table 3 Inuit suicide rates (age-standardized) by region and time period, 1989 to 2003

		rates per 100,000 population		
		ASMR	Lower CI	Upper CI
Nunatsiavut (Lab)	1989-1993	44.8 [1]	16.9	72.6
	1994-1998	87.5	41.7	133.4
	1999-2003	147.7 [1]	89.4	206.0
Nunavik (Que)	1989-1993	79.0 [3]	52.2	105.7
	1994-1998	76.0 [2]	50.8	101.2
	1999-2003	159.8 [2,3]	125.0	194.6
Nunavut	1989-1993	64.2 [4]	49.3	79.1
	1994-1998	80.7	64.9	96.5
	1999-2003	95.6 [4]	78.9	112.3
Inuvialuit (NWT)	1989-1993	21.7 [6]	5.4	38.0
	1994-1998	26.8 [5]	8.1	45.5
	1999-2003	69.9 [5,6]	38.5	101.2
All regions	1989-1993	59.6 [8]	49.0	70.1
	1994-1998	73.2 [7]	61.7	84.6
	1999-2003	112.3 [7,8]	98.4	126.1

Superscripts indicate that a number is significantly different from the second figure with the same superscript.

Consistent with past research, the area-based estimates show that young males make up the majority of deaths by suicide in the Inuit-inhabited areas. Over the 15 years covered in this study, over 80% of suicides were in males and almost two thirds (65%) involved people under the age of 25.

Figure 1
Suicides by sex and age group, Inuit-inhabited regions of Canada, 1989 to 2003



Factors related to suicide in Inuit-inhabited areas

As mentioned above, the second object of this study was to see whether groups of communities classified by various community characteristics revealed variations in suicide rates. The choice of variables was inspired by the literature, tempered by the indicators available on the 2001 Aboriginal Peoples Survey and the 1996 Census. The variables covered several different aspects of society and culture:

- Education and employment
- Tradition and culture
- Perceptions of community problems
- Social and civic activities

Education and employment

Education and employment are basic determinants of health status that are known to be related to suicide in southern Canada. Education was measured by looking at the proportion of a community's youth aged 15-24 that was still attending school (as of the 1996 Census). The reasoning was not only that school attendance could reflect the hope of obtaining a job in future, but also that schools provide social networks and gives youth something to focus on. Communities where over 50% of youth were still in school (that is, the top quartile) were classed as "high" on school attendance, while the remaining communities were classified as "low". Employment was measured in two ways: by looking at the community's employment-to-population ratio (in 1996), and also by a subjective measure—the proportion of residents who declared themselves "satisfied" with job opportunities in the community (in the 2001 Aboriginal Peoples Survey).

Both youth school attendance and the community's employment levels were quite strongly related to suicide rates. However, residents' *perceptions* of the job opportunities in the community showed no relation to suicide rates.

Table 4 Suicide rates by school attendance and employment variables

Community characteristic		Rate per 100,000 pop.	Confidence interval Lower bound	Upper bound	Statistically significant?
Youth school attendance	High	50.9	38.4	63.3	Yes
	Low	92.8	84.2	101.3	
Employment-to-population ratio	High	52.1	43.7	60.5	Yes
	Low	86.8	78.0	95.7	
Satisfaction with job opportunities	High	69.8	57.7	81.8	No
	Low	70.1	63.1	77.2	

Tradition and culture

Given the amount of attention that the relationship between acculturative stress and suicide has received, it is obviously important to include measures of the degree to which a community has retained links to its traditional culture and way of life. We looked at four measures. The first looks at retention of Aboriginal language, namely the proportion of a community's population that speaks an Inuit language at home. The other three indicators focus on the extent of participation in traditional land-based activities. They are, respectively, how many people in the community spent a month or more on the land in the previous year; what proportion of households contain one or more "harvesters"; and what proportion of households derive more than half of their meat/fish from harvesting. Note that the last measure does not necessarily mean that someone in the household hunts or fishes, since people might have received or bought country food from others in the community, but it is an indicator of the availability of country food in that community.

The results are somewhat surprising. On the one hand, retention of Aboriginal language and the presence of harvesters are strongly associated with suicide rates – but not necessarily in the way that would be predicted by acculturation theories, since rates are actually higher in the communities where large proportions of people still harvest and speak an Inuit language. On the other hand, suicide rates do seem to be lower in the communities where substantial proportions of residents spend extended periods of time on the land. The proportion of household meat derived from the land seemed to bear no relationship to suicide rates.

Table 5 Suicide rates by indicators of tradition

Community characteristic		Rate per 100,000 pop.	Confidence interval Lower bound	Confidence interval Upper bound	Statistically significant?
% who speak Ab'l language at home	High	95.8	84.2	107.4	Yes
	Low	49.0	42.9	55.0	
% hhlds that contain a harvester	High	99.6	85.3	113.8	Yes
	Low	55.4	49.4	61.4	
% residents who spent a month on the land	High	62.2	42.8	81.6	Yes
	Low	87.3	79.0	95.6	
% hhlds that obtain half their meat from land	High	68.3	58.9	77.8	No
	Low	64.6	57.5	71.7	

Community functioning and participation

In light of the research by Chandler and Lalonde and others, it seems reasonable to investigate whether measures of community functioning affect the suicide risk of residents. Neither the Aboriginal Peoples Survey nor the Census include indicators similar to those used by Chandler and Lalonde [1998], but there are a number of useful indicators available, which fall into two groups: the first is composed of responses to a multi-part opinion question "Do you think that …is a problem in this community?" In this way, respondents indicated whether they believed suicide, alcohol abuse, drug abuse, sexual abuse, family violence, and unemployment were issues in their community. The second group of indicators focuses more on community ties and activities. It includes the proportion of residents who say they have strong ties with other family members living in the community, the proportion who volunteered in the past year for a community organization or event and the proportion who are satisfied with the recreational facilities in the community. It also includes one indicator that could be expected to have a major impact on the quality of life in the community, namely the proportion of residents who frequently engage in "binge" drinking[4].

Perceived problems in the community

Understandably, communities with high suicide rates also have high proportions of people who indicate that suicide is a problem in their community. Suicide rates are also higher in the communities where large majorities of people agree that unemployment is an issue. The remaining results are surprising: for many indicators that are generally linked with suicide, the association is either non-significant, or in the opposite direction to what one would expect. Thus, there is no significant relationship between suicide rates and perceptions of either drug abuse or sexual abuse, although other research has shown

[4] Statistics Canada [2003] defines "binge" drinking as having five or more drinks on one occasion, and "frequent" binge drinking as doing this once a month or more.

that both of these factors are closely related to suicide risk. As for alcohol abuse and family violence, suicide rates are actually higher in the communities where people are *least* concerned about these issues. One possible explanation is that people's perceptions of community problems are not particularly accurate. An alternative explanation is that suicide risk is highest in communities where people are either unaware of the problems or not prepared to admit them—although both of these explanations beg the question of why the relationship is simply not statistically significant for some of the variables, rather than showing a significant difference in an unexpected way. Additionally, the question on the perceptions of suicide is the most strongly correlated of all community characteristics, making it clear that respondents had no difficulties in accurately reporting it.

Table 6 Suicide rates by perceptions of problems in the community

Community characteristic		Rate per 100,000 pop.	Confidence interval Lower bound	Confidence interval Upper bound	Statistically significant?
% who think alcohol abuse is a problem	High	55.3	48.6	61.9	Yes
	Low	81.5	71.4	91.6	
% who think drug abuse is a problem	High	57.6	50.0	65.2	No
	Low	65.4	57.9	72.8	
% who think sexual abuse is a problem	High	61.1	53.3	68.9	No
	Low	70.5	62.2	78.8	
% unemployment a problem	High	81.8	72.7	90.8	Yes
	Low	51.7	44.6	58.9	
% who think family violence a problem	High	56.5	49.0	64.0	Yes
	Low	74.8	66.2	83.4	
% who think suicide is a problem	High	120.7	105.4	136.0	Yes
	Low	48.0	42.4	53.6	

Social and civic activities in the community

Are suicide rates related to other measures of community functioning – such as recreational facilities, the proportion of binge drinkers, levels of volunteerism, or strength of family networks? Our results suggest that some of them are associated with suicide rates. Rates are slightly lower in the communities where residents are most satisfied with recreational facilities, but — surprisingly — there is no statistically significant

relationship between the proportion of frequent binge drinkers in a community and suicide risk.

The relationship with the proportion of residents who volunteer for community events is not statistically significant, but it is possible that the measure of volunteerism used in the Aboriginal Peoples Survey applies poorly to Inuit communities. Ellis suggests that standard measures of volunteer work fail to capture all the time that Inuit give to their extended families and to other people in their household [quoted in Henderson 2003: 21].

The suggestion that community involvement takes place largely through the extended family is consistent with the fact that this study—like much of the previous research—suggests that suicide risk is strongly associated with whether residents have close ties to other family members living in the community. In fact, of all the variables examined in this study, family ties seem to be the most strongly predictive of suicide rates, as measured by the size of the difference between the "high" and "low" communities, other than a perceived problem with suicide in the community.

Table 7 Suicide rates by indicators of social life in the community

Community characteristic		Rate per 100,000 pop.	Confidence interval Lower bound	Confidence interval Upper bound	Statistically significant?
% with strong ties to other family	High	32.0	24.7	39.3	Yes
	Low	80.3	72.9	87.8	
% who volunteer	High	52.6	34.4	70.9	No
	Low	71.6	65.2	78.0	
% satisfied with recreation opps.	High	56.6	46.1	67.2	Yes
	Low	69.5	62.8	76.3	
% of residents who binge frequently	High	75.0	62.4	87.6	No
	Low	68.6	61.4	75.8	

Discussion

This study has demonstrated that it is possible to extract suicide data for communities with substantial Inuit populations based on a geographic methodology. The rates calculated from these data may be considered conservative because of the number of non-Inuit included in the numbers. Nonetheless, we can see suicide rates many times that of the general Canadian population, rates which have increased dramatically over the 15 year period of study.

As demonstrated in the present study, one of the advantages of extracting data by this method is the potential to link to other data sources, thus opening up many possibilities for analysis. We have taken advantage of the common geographic approach to group

communities according to variables on the Census and the Aboriginal Peoples Survey, and to compare the suicide rates by different groupings of communities.

The results of this study indicate that some of the relationships between suicide risk and explanatory variables are more complex than they appear. The findings for the tradition and culture variables suggest a different picture than some of the one-directional theories about the impact of acculturation might predict. A few indicators of traditionalism, such as time spent on the land, appear to be associated with lower suicide rates; yet others that might be expected to lower suicide risk—such as speaking an Aboriginal language in the home and the presence of a harvester in the home—are actually associated with higher suicide rates. These findings argue for a more nuanced view of acculturation, as reflected in recent theories that postulate that suicide is linked to cultural transition rather than to acculturation *per se*.

What of other indicators of community wellbeing? The results here were mixed, and it is particularly surprising that the measure of binge drinking did not seem to be associated with higher suicide rates. Admittedly, the questions on drinking tend to have low response rates, and may also suffer from a social desirability bias. A number of the questions on perceived social problems in the community gave counterintuitive results, suggesting that more work must be done evaluating "perception" questions in terms of what exactly they measure. However, the results do suggest that social ties and belonging are clearly tied to lower suicide rates, and should be measured in future studies.

Interestingly, school attendance of youth turned out to be one of the variables most strongly related to lower suicide rates. Given that the majority of Inuit suicides involve youth, perhaps future studies should focus on indicators that relate to youth.
For instance, sample size permitting, it would be interesting to look at suicide in relation to youth employment rates, youth recreation, and so forth.

Clearly, many of the variables used in this study are inter-related. For instance, employment, community size, language, and a community's ethnic composition are all likely to be linked. Further, some of these factors—particularly language—are likely to vary systematically between the four Inuit regions.

Conclusion

This study has demonstrated that, in the absence of a Canada-wide Inuit identifier on vital statistics or data linkage program, it is still possible to obtain meaningful mortality data on suicide in Inuit communities. This first attempt has established suicide rates for four Inuit-inhabited regions of Canada, and also helped to identify a number of community factors related to suicide which are worth further investigation.

This socio-cultural analysis has identifies several indicators that appear to be associated with variations in suicide rates. What are some of the practical implications of the results? It would be unwise to base any firm conclusions on such preliminary findings, yet the data do suggest some avenues for exploration. For instance, the association

between school attendance and lower suicide rates is an interesting one, and raises the possibility that interventions to improve school retention might have spin-off benefits beyond their obvious effects on education. The findings with respect to tradition are also interesting, in that they raise some questions about the widespread view that greater retention of traditional ways in a community is always associated with lower suicide risk. Various initiatives in recent years have sought to raise self-esteem by restoring pride in heritage—e.g., by encouraging contact between elders and youth, reintroducing traditional language in schools, or promoting traditional drumming and dancing—and there is no doubt that this has been helpful to many people. If, however, the impact of acculturation has more to do with coping with transition, as suggested by recent research, then perhaps emphasis should not be placed solely on restoring traditional practices, but on helping youth find ways to integrate traditional values and practices into their current lifestyles. Finally, the results with respect to family ties reaffirm past findings that the maintenance and strengthening of social networks is of vital importance in preventing suicides.

All of the results have to be interpreted with caution; these suicide rates must be considered conservative in comparison to the suicide rate of the Inuit population. An analysis restricted to data for Inuit alone might give somewhat different results, but this is not feasible with the geography-based method. Based on the results of this initial exploration, these studies should focus on indicators of social networks, employment, schooling, and tradition. They must also take a closer look at the role of such indicators the retention of traditional language and way of life, which do not appear to be automatically associated with lower suicide rates in a community.

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Appendix 1: Definitions and cut points for the explanatory variables

As a general rule, comparisons were made between communities that fell into the top quartile (or close to it, if cutting at the quartile would meant allocating communities with the same value into different groups) vs all the remaining ones.

Census variables (1996)	
Employment-to-population ratio (popn. age 15-64)	Top quartile of communities: ratio of 65 and over.
School attendance of youth age 15-24	Top quartile: 51% and over.
APS variables (2001)	
Land – Spent one month or more on land in past year	Cut at top quartile: any value > 10%. Range is 1-28%.
Binge drinking. Frequent bingers defined as those who had five or more drinks at a sitting once a week or more often. Note that proportion of binge drinkers was calculated based on the total population of the community, not just the drinkers.	Cut at top quartile, 13% or more frequent bingers. Range is 1-71%.
Volunteer—residents who volunteered in the past year for either (a) a community organization or (b) a community event.	Cut at top quartile, values 65%+ Range 32 to 85
Satisfied with recreation facilities in community	Cut at top quartile, values 79%+ Range 7 to 100.
Family ties—residents who describe their ties with other family members living in the community as "strong" or "very strong."	Cut at top quartile, values 82%+ Range 38 to 100.
Aboriginal language in the home. If cut at first quartile, that would be 95% and over. Too high: cut instead at 85%, which includes 26 of the 51 CDs that show values for this variable. Proportions based on total pop'n of community.	Cut at 85%. Range is 2-100%.
Feel suicide is a problem in the community	Cut at top quartile, 85% Range 3 to 98
Feel unemployment is a problem in community Top quartile would be 94%. Using 90% instead gives 25 communities above the	Cut at 90%

cutpoint	
Feel family violence is a problem in the community	Cut at top quartile, 74%
Feel sex abuse is a problem in the community	Cut at top quartile, 70%
Feel drug abuse is a problem in the community	Cut at top quartile, 85%+
Feel alcohol is a problem in the community	Cut at top quartile, 88%
Persons satisfied with job opportunities in the community	Cut at top quartile, 55%
Households that contain at least one harvester (someone who hunts, fishes, or gathers wild berries or shellfish).*	Cut at median 85%
Households that derive more than half their meat from harvesting.*	Cut at median 36%
*Not enough households in group if cut at the quartile.	