

THE IMPACT OF RESOURCE DEVELOPMENT ON THE HEALTH OF NATIVE PEOPLE IN THE NORTHWEST TERRITORIES

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ABSTRACT/RESUME

This exploratory paper seeks to focus attention on resource development as one source of health problems among Native northerners and to identify some of the methodological and theoretical difficulties encountered in studying these problems. Some information available on the impacts of oil exploration employment in the Western Arctic and of the Fort McMurray Syncrude project on the health of affected Native communities is presented to exemplify the kinds of data currently available, their limitations and the difficulties that they pose for interpretation. Overall the paper emphasizes the scarcity of relevant data and the importance of studies in this area.

L'auteur de cette étude cherche d'abord à attirer l'attention des lecteurs sur le développement des ressources naturelles comme source des problèmes de santé éprouvés par les habitants autochtones du Nord, et ensuite à identifier certaines difficultés méthodologiques et théoriques rencontrées par le chercheur au cours d'une étude de ces problèmes. Il fait état aussi des informations maintenant disponibles concernant l'influence du travail d'exploration pétrolière dans la région occidentale du Nord, et du projet Fort McMurray Syncrude, sur la santé des communautés autochtones influencées, ceci dans le but de fournir un exemple des données actuellement disponibles, de leurs limites, et des difficultés inhérentes à leur interprétation. En somme, cette étude révèle la rareté de données pertinentes dans ce domaine et la nécessité d'y entreprendre encore des études.

INTRODUCTION

The intent of this paper is threefold: to focus the attention of social scientists on one source of health problems in the north, to identify some of the methodological and theoretical problems encountered in studying these conditions, and to review the information available on several northern resource development situations. Accordingly this paper must be viewed as exploratory; it does not claim to establish any relationships or to provide definitive solutions to any methodological or theoretical problems. But it is hoped that by elucidating some of the issues involved, indicating some of the data available and presenting information on some suggestive relationships, this paper may serve to stimulate the interest of other researchers in an important and relatively neglected area of concern.¹

HISTORICAL BACKGROUND

Native people have been significantly involved in industrial employment in the Northwest Territories of Canada for no more than 25 years, though there has been industrial activity, particularly mining, in this area for a much longer time. Since 1957, the number of projects in which sizable numbers of Native people have been employed has grown steadily.

The first significant beginning was at Rankin Inlet on the West Coast of Hudsons Bay in 1957, where the Rankin Inlet Nickel Mine could not have operated without the Inuit who comprised about three quarters of the work force. Although it closed after only six years, when the ore body was exhausted, the capabilities of northern Native workers had been well demonstrated (Williamson, 1974). The lesson was lost on the mining industry in both the Northwest Territories and the Yukon, but not on the oil industry which conducted very active seismic exploration and drilling programs in the Mackenzie Delta from 1966 to 1978; in the High Arctic islands from the late 1960's to the present; and in the Beaufort Sea off the Mackenzie Delta from the mid 1970's to the present. Native people were very heavily involved in the Mackenzie Delta and the Beaufort Sea exploration programs. This was also true to a lesser extent in High Arctic exploration.

Since the early 1970's Native people have been increasingly employed in mining projects as well. They comprised a substantial portion of the work force which built the Nanisivik Mine on Northern Baffin Island, and then of the operational crew of the working mine (Baffin Region Inuit Association, 1979). Inuit workers have figured heavily in the construction and the manpower planning for the Polaris Mine on Little Cornwallis Island in the High Arctic, and the Lupine Mine at Contwoyto Lake, 380 km northeast of Yellowknife, both of which began operations in 1981. Other mines yet in the planning stage, anticipate making extensive use of northern Native labour.

Another recent development involves the Norman Wells (N.W.T.) oil field and refinery. This Esso Resources operation ran for about 50 years with very few Native people involved, these employed mostly as casual labour. However

about 1980 Esso began initiating planning towards massive expansion of the oil field, construction of a pipeline to carry the increased production south, and recruiting and training of Native workers to staff all phases of the expanding operation. Other projects still in the planning stage, including proposals to produce and ship liquified natural gas from High Arctic gas fields and proposed oil and gas pipelines south from the Mackenzie Delta, all anticipate heavy involvement of Native workers as well.

Most of the concern which has been expressed about these projects has focused on their possible environmental impacts, though many of the witnesses who testified at the hearings of the Berger Inquiry into the proposed Mackenzie Valley Pipeline did address the issue of the possible effects of this project on the health of Native people (Berger, 1977). But as the session on "The Impact of Northern Development on Public Health" at the Canadian Public Health Association in Yellowknife during June 1982 indicated, there is very little systematic knowledge of the specific health impacts of recent development projects.

MODERNIZATION VS. DEVELOPMENT

Two difficulties are encountered in seeking to assess accurately the impact of resource development projects on the health of Native people in Northern Canada. The first is the problem of trying to differentiate between the effects on health of the impacts of development activity and the more general effects of "modernization," that is, the massive recent changes which have taken place in most Native communities.² The second difficulty is the scarcity of relevant research findings.

In respect to modernization, it is virtually impossible to exaggerate the significance of changes that have taken place in the life styles of Native people over the last 20 to 25 years. Foremost of course is the general movement from a semi-nomadic existence in scattered camps in the bush or on the tundra, to settlements, where most people live in two, three, or four bedroom houses, often with fuel oil for heating, electricity, and water and sewer services supplied at below cost. Changes in diet have come in many communities with the reduced availability of traditional foods because of greater hunting or fishing pressure on smaller areas, a result of concentrated and rapidly growing populations seeking to satisfy their traditional food preferences within reasonable proximity to the home community.

Some exposure to formal schooling is now virtually universal among Native people aged 25 years and less, and the ability to speak English or French has increased apace. Professional health care is now locally available in all but a few, very small communities. Communication and transportation systems have expanded rapidly: live television is now available in all but the smallest settlements, and highway systems extend as far as Inuvik, well north of the Arctic Circle. Air service to even small settlements is typically available several times weekly, and often there are daily flights.

This sudden profusion of influences has had both good and bad conse-

quences for health conditions among the Native people of the Canadian North. Some of the beneficial effects are dramatic indeed. In Gjoa Haven, in the central Arctic, between 1958 and 1963 half of all the babies died during their first year and the infant mortality rate among the total Canadian Inuit population was 250 per 1000 live births (Gousart, 1963; Northern Health Service, 1962). During the late 1940's and early 1950's the death rate from tuberculosis among Native people of the Northwest Territories was over 500 per 100,000 annually, and indeed 10 percent of the entire Inuit Eskimo population was hospitalized for treatment of this disease (Chief Medical and Health Officer, 1975). As a result both of the efforts of public health personnel and the changes in lifestyle during the subsequent years, the improvements in both areas have been dramatic. The death rate among Inuit infants fell to 20.4 per 1000 live births by 1982, and there has not been a death from tuberculosis in the Northwest Territories since 1968 (Director of Health Programs, 1982).

But modernization has inevitably introduced many new health hazards as well. In Inuvik in the early 1960's there were young men who froze their feet in winter because they disdained traditional footwear in favor of the leather "jack boots" which were then in style. Modern young Native mothers often preferred the stylish zippered parka to the traditional amauti which permitted carrying the baby next to the mother, on her back. These young mothers had to carry their babies in their arms, much more exposed to the cold, with resulting increases in infant morbidity, and mortality as well. School children brought to live in the residential hostels in Inuvik from across the expanse of the Western Arctic, sometimes suffered during the transition they experienced when they were returned home in the spring, from the cold of their homes after the warm hostel, and from the predominantly meat diet after the carbohydrate-rich diet they consumed at school (Hobart, 1970).

More recently, access to live television exposes Northerners to a wide variety of undesirable influences. For example, it is certainly one of the stronger influences in making many northern communities familiar with the junk food consumption, the patterns of violence and the images of liquor and drug abuse common in some parts of Southern Canada.

Undoubtedly the most generally disastrous hazard of all has been the widespread increased availability of liquor which has inevitably come with vastly improved transportation. Though local liquor outlets are few and far between, alcoholic beverages are everywhere easily imported by individuals, by chartered small plane, or by mail ordered shipments. Table 1 presents data on rates of alcohol consumption and of crime in communities of the Mackenzie Delta for the years 1960-1970. Generally the data show rather steady increases in per capita consumption during the decade. The crime data show that whether one considers the liquor or the non-liquor offences the pattern is largely erratic, suggesting perhaps that within the context of this level of increase in alcohol consumption, many Native people were able to learn to "handle their liquor" at least well enough that offense rates showed no parallel rise. Nevertheless, there was anecdotal evidence during this period of drunken violence, inebriated persons freezing to death or dying in house fires caused by carelessness, and

TABLE 1: Inuvik Region Liquor Store¹ Sales, 1972 Constant Dollars and Litres of Absolute Alcohol, and Convictions for Non-Liquor Offences in Magistrates Courts in Beaufort Delta Communities,² 1960-61 - 1969-70

Year	Value in 1972 Constant Dollars		Litres Absolute Alcohol		Convictions: Non- Liquor Offences	
	Total	Per Capita	Total	Per Capita	Total	Rate per 1000 pop.
1960-61	\$310,201	\$113.0	7439	10.2	Data Incomplete	
1961-62	342,726	115.2	8222	10.5	101	36.5
1962-63	359,562	112.4	8622	10.2	108	36.3
1963-64	444,429	129.8	10660	11.6	55	17.3
1964-65	442,065	121.1	10603	11.0	87	25.6
1965-66	521,067	134.4	12497	12.2	77	21.0
1966-67	612,140	149.2	14682	13.5	111	29.1
1967-68	643,604	150.5	15438	13.6	169	42.5
1968-69	770,089	173.1	18469	15.7	121	29.2
1969-70	879,418	190.4	21092	17.3	140	32.5

¹This is the only liquor store in the Northwest Territories north of Norman Wells, and west of Frobisher Bay. It primarily serves the Mackenzie Delta - Beaufort Sea communities.

²Includes Inuvik, Aklavik, Fort MacPherson, Arctic Red River, Tuktoyaktuk, Sachs Harbour, and Paulatuk.

Source: Calculated from data in Hobart, 1978.

child neglect by drunken parents. Thus there are indicators that, for at least a minority, there were increased problems due largely to alcohol abuse. Specific data exploring the relationships between alcohol consumption and violent injuries and child abuse are presented later in this paper.

There are other, less dramatic, but probably in the long run more damaging impacts of modernization on the health of Native people. I refer to the increasing incidence of characteristically southern white diseases among Native people: cancer, heart disease and other stress diseases. Table 2 presents data on causes of death among Indians and Inuit in the Northwest Territories for the census years 1961 through 1981. These data indicate significant increases in deaths from diseases of the circulatory system among Indians and Inuit, and from neoplasms among Inuit during these years, but further discussion of these

TABLE 2: Causes of Death of Among Indian and Inuit Residents of the Northwest Territories, 1961, 1966, 1971, 1976, 1981; Percent of Deaths

Cause of Death	1961		1966		1971		1976		1981	
	Indian	Inuit	Indian	Inuit	Indian	Inuit	Indian	Inuit	Indian	Inuit
Infectious and Parasitic Diseases	11%	9%	2%	4%	0%	4%	0%	0%	0%	2%
Neoplasms	2	2	22	6	9	8	10	16	18	17
Nervous system and sense organs	2	5	2	6	4	3	2	5	3	1
Disease of Circulatory system	4	3	8	5	13	9	13	15	31	5 ²
Disease of Respiratory system	11	21	28	34	13	18	15	16	9	10
Disease of Digestive system	18	5	0	7	2	5	6	4	3	2
Infancy Diseases, Congenital Conditions	4	15	10	16	13	19	11	5	3	10
Injury, poisoning	16	6	15	14	33	26	40	33	23	41
Senility and other causes	31	35	10	6	13	9	4	7	11	13
Total	99 ¹	101 ¹	97 ¹	98 ¹	100	101 ¹	101 ¹	101 ¹	100	101 ¹
Total number of deaths	45	172	40	123	46	117	53	103	35	95

¹percentages do not total to 100 due to rounding.

²In 1980 this figure was 24%.

Source: Report on Health Conditions in the Northwest Territories, 1961, 1966, 1971, 1976, 1981.

changing mortality patterns is beyond the scope of this paper.

There is no implication here that modernization efforts should be terminated, so that Native people may be encouraged to revert to purely traditional modes of survival. That would require reversing changes that began as early as the 17th century in the Eastern Canadian Arctic, and the 18th century in the West. The Danes tried to exclude many modernizing influences during much of their administration in Greenland. They found that by the late 1950's they were compelled to modernize at a very rapid rate, and this gave rise to new problems. In their eagerness to protect the Greenlanders (Eskimos) from over-rapid modernization they brought in Danish workmen to construct the infrastructure, housing and facilities required by planning for the economic self-sufficiency of Greenland. This was seen as necessary to void disrupting the more traditional subsistence activities of the Greenlanders who would otherwise have become short-term construction workers. As a result, Greenlanders stood around and watched the transient Danish workers monopolize the highly paid construction jobs, and sleep with Greenlandic women at night. While this was yet in progress, some officials in the Danish Ministry for Greenland acknowledged that this policy had been a serious mistake. Realistic solutions to the problems of today cannot be found in reversion to the past.

What have been the effects of resource development activity on northern areas where Native people have already experienced very rapid social change? Typically the consequences of resource development projects have been to broaden and perhaps to accelerate the pace of changes already in process in northern Native communities. There are stories to be heard of the impacts of some projects on Native people: of southern construction workers debauching Native young people, particularly young women; and of Native workers and their families using their unprecedented earnings to get blind drunk, neglecting their children and assaulting, maiming and killing each other. There have been some incidents of this sort, no doubt, but much of this pattern is not new or uniquely a product of recent development activity. Trappers, particularly in the Mackenzie Delta, have periodically experienced sudden riches, and have celebrated drunkenly and sometimes violently, for the past three generations. But this has certainly not been the typical pattern. Several studies show that most Native workers employed by development projects have been primarily interested in buying new skidoos, boats, and other game and fish harvesting equipment with their earnings (Hobart and Kupfer, 1975; Roberts, 1977).

ASSESSING THE EFFECTS OF DEVELOPMENT PROJECTS ON HEALTH

These remarks provide the backdrop for consideration of the impacts of development projects on the health of northern Native people. It is obvious that resource development projects have introduced some new threats to the health of Native people, and have exacerbated some pre-existing threats. But unfortunately, as the session on "The Impact of Northern Development on Public Health" at the Canadian Public Health Association in Yellowknife in June 1982 demonstrated, there is in fact minimal systematic knowledge of the

specific health impacts of recent development projects on Native people in this country. A review of the literature leads to the surprising conclusion that very few relevant recent studies have been conducted in Canada. A search of the Index Medicus for the years 1975 through (October) 1982 under the headings "Eskimo" and "North American Indian" yielded information on studies of a broad range of conditions: breast cancer risk (Morgan et al., 1978), respiratory function impairment (Schaefer et al., 1980b), meningitis (Wotton et al., 1981), dental health conditions (Mayhall, 1977), high stress pregnancies (Murdock, 1979), nutrition (Schaefer et al., 1980a), chronic otitis media (Baxter, 1977), fertility (McAlpine et al., 1975), ocular conditions (Carey, 1977), and alcoholism (Brod, 1975). The most relevant of these dealt with "Acculturation and Mental Disorder in the Inuit" (Seltzer, 1980), and mercury poisoning among Manitoba Indians. An unpublished Ph.D. thesis attempting to relate infant morbidity conditions to resource development projects found no evidence of adverse effects (Wahn, 1980).

Thus, despite the high visibility of megaprojects (such as Syncrude, Arctic oil exploration, and northern mining activity), and the fact that virtually all are located in northern areas where Native people predominate, sometimes in sizable numbers, there appear to be no published studies of the effects of these development projects on the health of affected Native people.

Though there is little in the way of rigorous empirical evidence, Smith has suggested that development activity has had deleterious effects on the environment and the lifestyle of northern Native people (1982). The environmental impacts include those associated with hearing impairment, industrial accidents, and illness or poisoning due to toxic chemicals, and they are clearly new health threats. These are some of the currently inevitable risks endured by some members of an urban industrial society. Heretofore northern Native people have generally escaped exposure to them, but this changes as more industrial employment becomes available in northern areas.

These environmental impacts are easily identified, and to date at least, affect very small numbers of northern residents. With careful monitoring and conscientious enforcement of industrial safety and environmental pollution regulations, health threats from these sources should be controllable, and few endangered. Certainly the costs to life and limb will be less than those experienced by northern peoples in pre-contact times, and during the "age of trapping" which lasted until the close of World War II.

The effects of development on lifestyle include changes in dietary habits, increased exposure to sexually transmitted diseases, and the varied dangers associated with increased alcohol consumption. Because all of these changes have accompanied "modernization," none can be uniquely ascribed to resource development, though development projects have no doubt enhanced these problems in some areas.

It is these changes that development may well induce in Native life styles that pose the most serious threats to health and safety. At this time it is not possible to put together a comprehensive picture of the non-environmental health impacts of these projects. The immediate reason for this is the scarcity of relevant studies, noted earlier. It is remarkable, for example, that not even the

socio-economic reviews of the Beaufort Sea drilling program, compiled by the Government of the Northwest Territories, made any attempt to determine the effects of this massive development activity on the health of Mackenzie Delta residents. This oversight is particularly difficult to understand in the case of Tuktoyaktuk, the Inuit community which houses the Esso Resources and Dome-Canmar Marine Drilling base camp and has been profoundly changed by the drilling activity (Zariwny et al., 1978; Bertolini and Foster, 1981).

There is a more difficult methodological reason why definitive statements on the health impacts of development projects cannot be made at this time: given the very small populations and the disease incidences involved, it is very difficult to differentiate accurately between the effects of modernization, and those of resource development activity, on the health of the relatively few individuals or communities actually exposed to these projects. Nevertheless, some relevant suggestions may be made. Where one or a few of a cluster of generally similar communities has experienced very high levels of industrial or development employment, the patterns of morbidity rates of the high employment communities may appropriately be compared with the rates of similar communities having low employment rates. An example would be Tuktoyaktuk, which since the late 1970's has experienced much higher levels of oil exploration employment than other Delta communities such as Aklavik or Fort McPherson. True, the latter two differ from Tuktoyaktuk in ethnic composition, but the issue is whether the trend patterns of rates for specific morbidity conditions are similar or diverge in the high employment community. While the results of a single such comparison would be inconclusive, a consistent pattern of relationships would carry more weight.

Even where comparison communities are not available, an answer to the question of impacts on health can yet be attempted if adequate time-series data are available. If development activities are having significant impacts on health conditions, they should produce a change in the long term trend patterns of rates for various morbidity conditions. A more conclusive indication would be a pattern which was consistent before and after the development activity was in progress, but was contrasting during the activity. However in the case of an ongoing development project, a new pattern which became apparent after the onset of the project and which was significantly divergent from the pre-development trend, might be taken as quite indicative.

RECENT RESEARCH

Some scattered attempts to assess the impacts of development on health have been made. One of the more comprehensive has been Hobart's efforts to monitor the consequences of oil exploration employment, and its aftermath, on Coppermine in the Northwest Territories (Hobart, 1973; Hobart, Walsh, 1980).

The context of this research is as follows. Coppermine is a small settlement with about 800 inhabitants of whom about 90 percent are Inuit. It is located on the Arctic Coast about 775 km east of Inuvik. Prior to the onset of the oil employment program it was a traditional community where very few people

TABLE 3: Value of Liquor Shipment to Coppermine
August 1, 1971 to July 31, 1980

	Current Prices	1972 Constant Dollars	Percent ¹ Change
8/1/71 to 7/31/72	\$16,968	\$16,968	
8/1/72 to 7/31/75	21,270	21,270	25% Increase
8/1/75 to 7/31/74	20,370	18,923	12% Increase
8/1/74 to 7/31/75	2,2555	18,692	10% Increase
8/1/75 to 7/31/76	17,677	13,523	20% Decrease
8/1/76 to 7/31/77	22,822	17,459	3% Increase
8/1/77 to 7/31/78	24,945	17,037	0.4% Increase
8/1/78 to 7/31/79	34,366	20,789	23% Increase
8/1/79 to 7/31/80	34,110	19,255	13% Increase

¹Relative to the 1971-72 value.

²Last year before onset of the oil exploration employment.

Source: Figures supplied by the Territorial Liquor Store in Yellowknife.

had experienced industrial employment. However from 1973 through 1978 during the winter and spring drilling seasons, between 50 and 90 Coppermine Inuit were employed at oil exploration camps in the Mackenzie River Delta. They worked a rotation schedule in which they stayed at the drilling sites for two weeks, and then returned home for one week. As a result, the community was well buffered from direct contact with the drilling project. It was possible in Coppermine to monitor precisely the earnings from development, the volume of liquor imports, and a few health indicators as well. These indicators included (1) violent woundings, (2) respiratory infection rates among infants and pre-school children, seen as an indicator of the quality of parental care, and (3) the DFM index of damaged, filled and missing teeth among school children. In addition, interviews conducted annually with the local nurses and two community-wide surveys provided information on people's perceptions of the health related consequences of the exploration employment. No attempt was made to assess whether there was an acceleration of the drift from more traditional to more modern distributions of morbidity conditions in the community.

The pattern of findings in Coppermine is an interesting one as the data in

TABLE 4: Alcohol Related Violent Injuries by Sex and Marital Status-
Coppermine, 1971-72 to 1978-80

	Females			Males			Total Sample
	Single	Married	Total	Single	Married	Total	
Nov. 1, 1971-72 ¹	3	6	9	3	5	8	17
Nov. 1, 1972-73	5	10	13	3	4	6	19
Nov. 1, 1973-74	1	15	16	3	5	8	24
Nov. 1, 1974-75	1	9	10	2	9	11	21
Nov. 1, 1975-76	1	5	6	1	8	9	15
Nov. 1, 1976-77	2	6	8	-	2	2	10
Nov. 1, 1977-78	-	12	12	1	7	8	20
Nov. 1, 1978-79	1	11	12	2	6	8	20
Nov. 1, 1979-80	1	7	8	2	8	10	18

¹Last year before onset of the oil exploration employment.

Source: Nursing Station records, Coppermine, N.W.T.

Tables 3-6 show. During the first year of the exploration employment there was a 29 percent increase in liquor consumption (Table 3). There was a parallel increase in liquor related violent woundings, particularly centered on married women, some of whom were suspected of adultery by their husbands during the latter's absences at the drilling rigs (Table 4). However, both the liquor consumption and the violent woundings declined thereafter so that by 1975-76 both were at levels below those found prior to the onset of the exploration employment program. With termination of Gulf employment in 1978, both rates tended to increase once more. The fact that this alcohol consumption curve is U-shaped is noteworthy, and suggests that in this community, at least, it may have been the transitional stresses associated with the onset and the termination of employment which helped induce increased liquor consumption, and accompanying violence.

Data showing the rates of respiratory infection among infants and pre-school children in Coppermine for 1971-72, prior to the onset of the exploration employment, through 1978-79, are found in Table 5. These data appear to reflect chance fluctuation, with 1974-75 the peak year, followed by two low

TABLE 5: Respiratory Infections Among Infants and Small Pre-School] Children, November 1971-1979

Year	Infants		Preschool		Total	
	No.	Monthly Rate per 100	No.	Monthly Rate per 100	No.	Monthly Rate per 100
1971-72 ¹	144	64	295	20	439	26
1972-73	93	50	283	18	376	21
1973-74	93	65	248	19	341	24
1974-75	73	40	192	32	265	34
1975-76	76	32	63	6	139	11
1976-77	30	11	37	4	67	6
1977-78	69	29	103	14	172	18
1978-79 ²	55	.37	77	.08	132	12

¹Last year before onset of the oil exploration employment.

²Based on data from November 1978 through July 1979 only.

Source: Coppermine Nursing Station Record.

years, 1975-76 and 1976-77, which were in fact peak exploration employment years. Thus there are no indications of elevated rates of child neglect during the employment period.

The final set of relevant data is comparable information on the number of damaged, filled and missing teeth among school children aged six through 15 years, in Coppermine and in Eskimo Point, a community of similar size which had no experience with development-related employment. The data, seen in Table 6, show that the average number of damaged and missing teeth, was 7.8 per child in Coppermine and 10.1 in Eskimo Point. This suggests not only that the exploration employment in Coppermine during the preceding six years did not result in deteriorating dental health, but also that dental health among Eskimo Point children was significantly poorer than among their Coppermine age mates.

Reliable informants in Coppermine reported that the exploration employment did not result in shortages of fish or game foods which might have adversely affected nutritional patterns in this community. Indeed, fur harvest data which are reliably recorded by the Territorial Government in collecting

TABLE 6: Decayed, Missing and Filled Teeth Among Children in Coppermine and Eskimo Point, 1978*

Age (years)	Total Children		Decayed Teeth				Missing Teeth				Filled Teeth				Total Decayed Missing and Filled			
	Cop-mine	Esk. Pt.	Number Cop-mine	Number Esk. Pt.	Average Cop-mine	Average Esk. Pt.	Number Cop-mine	Number Esk. Pt.	Average Cop-mine	Average Esk. Pt.	Number Cop-mine	Number Esk. Pt.	Average Cop-mine	Average Esk. Pt.	Number Cop-mine	Number Esk. Pt.	Average Cop-mine	Average Esk. Pt.
5-7	35	31	141	223	3.9	7.2	105	58	2.9	2.2	85	11	2.4	0.4	333	302	9.2	9.7
8-9	40	39	78	116	2.0	3.0	135	197	3.4	5.0	197	39	4.9	1.0	410	352	10.2	9.0
10-11	30	37	10	28	0.3	0.8	45	376	1.5	10.2	72	18	2.4	0.5	127	422	4.2	11.4
12-13	34	20	42	66	1.2	3.3	39	59	1.2	3.0	172	74	5.1	3.7	253	199	7.4	10.0
14-15	32	13	67	59	2.1	4.5	51	31	1.6	2.4	222	54	6.9	4.2	340	144	10.6	11.1
Total	172	140	208	492	1.2	3.5	376	731	2.2	5.2	749	196	4.4	1.4	1333	1419	7.8	10.1

*Source: School of Dental Therapy, Medical Services, Health and Welfare Canada, Fort Smith N.W.T.

TABLE 7: Hospitalizations by Selected Causes, Alberta, Fort MacKay, Fort Chipewyan 1972-76

	Total Hospitalizations [‡]			For Injuries/Poisoning			Mental Disorders in Non-Mental Hospitals [‡]		
	All Alberta	Fort MacKay	Fort Chipewyan	All Alberta	Fort MacKay	Fort Chipewyan	All Alberta	Fort MacKay	Fort Chipewyan
1972 Patients	216	845	328	24.0	88.7	45.0	8.2	5.0	11
Patient Days	2418	7570	6511	252.1	290.3	562.5	159	159	81
1973 Patients	208	667	266	25.9	95.6	29.7	8.4	0.0	9
Patient Days	2589	5265	5459	257.6	450.2	276.6	142	0.0	83
1974 Patients	213	1011	268	24.6	106.5	32.4	9.2	16.7	5
Patient Days	2559	9772	2982	259.4	665.4	401.5	145	100	55
1975 Patients	201	960	275	22.4	96.9	28.5	8.4	46.0	9
Patient Days	2220	10173	5505	211.8	771.5	541.7	141	2201	205
1976 Patients	198	910	288	25.1	65.4	50.5	8.2	24.0	14
Patient Days	1681	10319	3624	195.6	850.1	198.0	112	760	152

[‡]per 1000 Population.

Source: Statistics supplied by Hospitals and Medical Care, Government of Alberta.

taxes on furs, show that hunting and trapping yielded increased harvests during these years. The explanation for this is that people often used their employment earnings to buy needed harvesting equipment - snowmobiles, boats and out-board motors, for example - so that the amount of this equipment increased during this period. As a result, workers and those relatives who had access to their equipment were able to harvest fish, game and furs more efficiently.

These findings are not unique: Roberts found similar results in a study of the effects of Pan Arctic Oil employment on two Baffin Island Inuit communities, Arctic Bay and Pond Inlet, in 1975 (Roberts, 1977).

No information on the effects of the exploration employment on mental health conditions is available for Coppermine, however data on hospitalization for mental disorders, as well as for injuries and poisonings, are available for two Native communities in northeast Alberta during the Syncrude construction phase in Table 7. The communities in question are Fort MacKay, with a population of about 260 situated a mere 15 km by good gravel road from the Syncrude plant site, and Fort Chipewyan, population about 1100, located 225 km to the north and accessible only by air. Both have populations which are about 90 percent of Native origin, and people from both worked at the Syncrude construction site. However their different situations meant that they were subjected to differing patterns of impacts.

The data in the table, and other data not included here, well illustrate some of the problems encountered in the interpretation of impact data for small Native communities. What is a relevant comparison base where adequate time-series data do not exist? In the table, data for all of Alberta are provided, but its relevance is questionable even for a five year trend. Generally there is no basis for concluding that rates of hospitalizations for mental disorders and personal injuries changed significantly during the construction period in the case of Fort Chipewyan, where indeed less change would be expected than in the case of Fort MacKay. The Fort MacKay data present a different pattern. The injuries rate increased early in the construction period by 29 percent, from 82 per 1000 population in 1972, to 106 in 1974, declining thereafter to 97 in 1975 and 65 per 1000 in 1976. Thus for 1972 through 1974 there was a distinct increase in rates of patients hospitalized for personal injuries for this community. A part of the explanation for the post-1974 decline is that the Provincial Government became concerned about violence in the community, and arranged to have a community development worker live there for about a year and a half while helping the community cope with the conflict it was experiencing (Applied Research Associates, 1978).

The data in Table 7 also show a noteworthy increase in rates of Fort MacKay patients hospitalized for mental disorders. Between 1972 and 1975 the rate of patients increased by 820 percent, from 5.0 in 1972, to a 1975 peak of 46 per 1000 population, and then fell to 24.0 in 1976. These increases during the 1974-1976 period suggest that the pressure of living in such close and accessible proximity to the mammoth Syncrude project may have contributed in an important way to the increase. On the other hand this community was experiencing other, independent modernizing pressures, as well as considerable

intra-community conflict at the same time, as noted above. Thus it is conceivable that the increase may have been due to random fluctuations among very low patient numbers, or to other, non-construction related acculturative pressures, or to a secular trend exaggerated by random fluctuation. All of these influences may have been operative, but the low frequencies make disaggregation impossible.

The all-to-few collections of hard data which have been briefly considered here seem to indicate that short term impacts on the health of affected Native communities may be expected from development projects. We are not aware of any statistical evidence demonstrating more serious long term development-related impacts on the health of Native communities in Canada, if one excludes environmental poisoning, such as mercury poisoning of rivers and acid rain destruction of life in lakes. This conclusion is corroborated by results from the Northwest Territories Perinatal and Infant Mortality and Morbidity study of the health of all infants born between April 1, 1975 and March 31, 1974, during their first year of life. There were no indications from this study that higher mortality or morbidity rates were found in communities which had experienced development impacts than in other communities (Spady et al., 1982; Wahn, 1980).

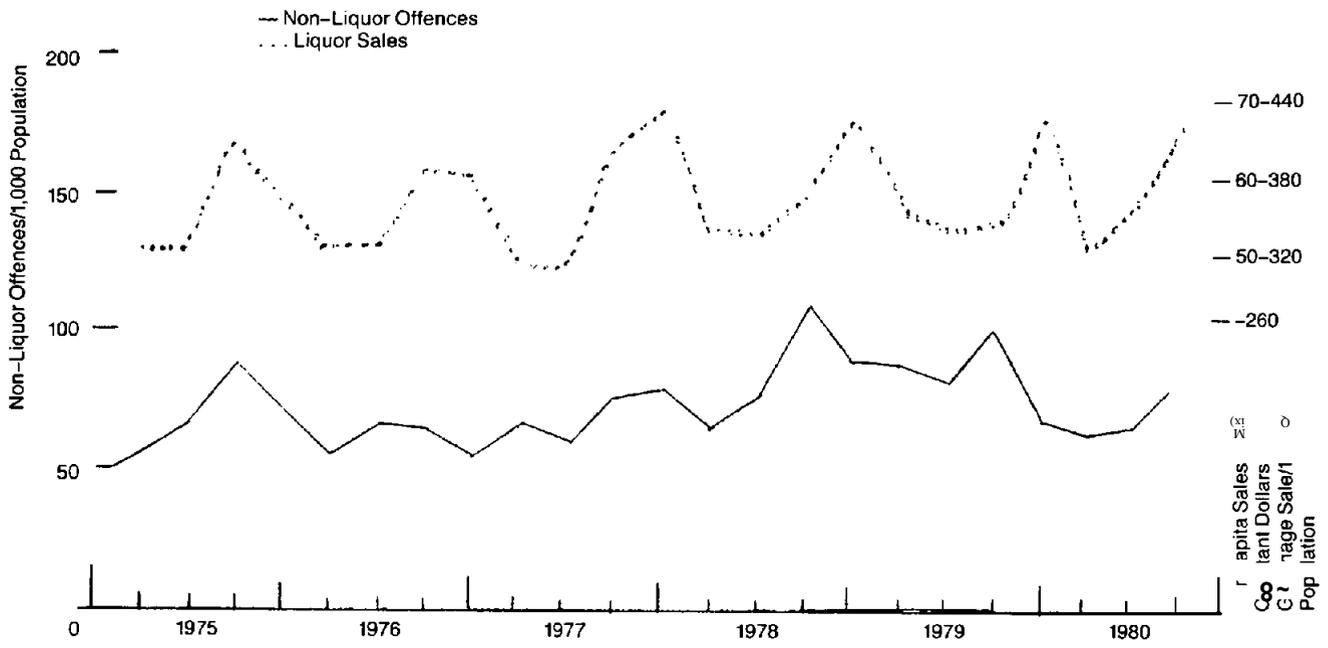
Health conditions are certainly most at risk in communities adjacent to very large development projects, such as Tuktoyaktuk, or which are centres of development boom activity, like Inuvik. Unpublished data show that there was a rapid increase in per capita liquor consumption in Mackenzie Delta communities with the onset of a high level of exploration activity, from 3.61 litres of absolute alcohol per capita in 1967-68 to a peak figure of 7.86 litres in 1976-77. Thereafter the consumption level fell, only to increase again, with the offshore exploration boom, to 8.78 litres in 1980-81. Figure 1 shows that fluctuations in the volume of liquor consumed have tended to parallel rates of crimes known to the police since 1975. While some of the alcohol consumption and some of the crime are ascribable to the transient whites who crowded Inuvik during many of these years, most of the drinking, and no doubt most of the crime as well, involved only Native people (Wong, 1975).

Unfortunately the impacts of these developments on the health of Mackenzie Delta inhabitants remain unstudied. Published data indicate that there was no increase in syphilis in this health district during these years, but that there were significant increases in gonorrhoea. Little else is clearly known at this time.

CONCLUSION

I emphasized at the outset of this paper that this is an exploratory discussion, designed to acquaint readers with some of the issues and problems which are currently encountered in research on influences affecting Native health conditions, as well as to indicate some of the current and prospective research opportunities. It would be a mistake to conclude that any of the relationships which have been described in this paper may be taken as established.

Figure 1
 Inuvik Liquor Store Sales and Non-Liquor Offences
 Beaufort Sea Area
 1975-1980



SOURCE: Bertolini, Esther and Terry Foster, 1981.

In every case they are to be taken as suggestive or illustrative, no more.

Inevitably, the most obvious conclusion to be drawn from the preceding pages is the trite but inescapable observation that research assessing the impacts of development projects on health conditions in affected communities is urgently needed. Recent computerization of morbidity data for the Northwest Territories will greatly assist in conducting such research. The Yukon Territory is moving in the same direction as well.

A second conclusion is that while development is viewed by many as a *bête noir*, a recent and massive threat to the established life style of Native communities, from a socio-medical perspective there is evidence that development influences exhibit much continuity with acculturative influences which have been cumulating for 150 or more years in many parts of the Territories. However, at this juncture it is not possible to draw any conclusions about the consequences of development projects for health conditions in affected Native communities. It appears that in certain contexts recent development activity has had some adverse impacts: Coppermine and Fort MacKay are cases in point, though in both cases these effects appear to have been short term. On the other hand, there appear to have been no significant ill effects in the community of Arctic Bay which has experienced oil industry employment in a degree comparable with Coppermine, though the available evidence is less than complete (Baffin Region Inuit Association, 1979; Hobart, 1976; Roberts, 1977).

It should be emphasized, in conclusion, that to date no adequate efforts have been made to assist any Native communities in the Northwest Territories in managing the effects of development projects, so as to minimize adverse health and other impacts, and to maximize benefits. Typically these communities have been left to "sink or swim". One of the important tasks of the future is to work with these communities to help them anticipate and cope with the probable effects of a variety of projects that will likely be launched sooner or later. Such assistance is particularly important and urgent in planning for impacts on health conditions.

NOTES

1. This is an expanded version of a presentation at the panel on the Impact of Northern Development on Public Health, Canadian Health Association Conference in Yellowknife, N.W.T., June 21-24, 1982. I am indebted to my colleagues Judy Golec and Herb Northcott for some helpful suggestions.
2. It is true, of course, that resource development activity may be a "modernizing" influence, or it may be seen as part of the modernization process. In this paper, however, I am treating modernization and resource development as conceptually distinct.

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