



*Photo: Alaska Department of Health*

A sanitation aid at Unalakleet filling an abandoned gasoline drum that he has converted into a water tank. He is an Eskimo boy who received his instruction from the Health Department sanitarians in Alaska and now teaches other villagers how to make the same type of installation for safe water supplies.

## *Commentary*

# OBSERVATIONS ON ARCTIC AND SUBARCTIC HEALTH

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**A** MISCONCEPTION too often held by Americans and Canadians is that health care in the North American Arctic and Subarctic is inadequate or non-existent. This is not now the case, for throughout the Subarctic and in parts of the Arctic modern health and medical services do exist and rapid improvement is under way. One incentive to this improvement is its influence on population growth which plays such an important part in the development of the vast northern regions.

In the early periods of settlement, as the conditions in Alaska and Northern Canada became known, church groups and governmental agencies realized the urgent need for health services but their efforts to promote them made little permanent impact. The Royal Canadian Mounted Police and Canadian and United States government employees assigned to the North made major contributions during the early years of development, but all care was directed toward meeting acute emergencies only. There are also many records of heroic and dramatic measures undertaken by medical missionaries, nurses and members of expeditions to save life and limb, and private groups and individuals have continued through the years to administer medical aid. However, it was not until the third decade of this century that the Canadian and United States governments instituted programs which had a telling effect on health conditions in their northern territories through the establishment of improved public health and medical care programs.

One great problem in the North is permafrost; it not only hampers many engineering programs but is a menace to health. Authorities estimate that 20 per cent of the land surface of the world is covered with permafrost, and in 66 per cent of Alaska it is a serious problem. Areas of Alaska and Canada even south of 60° N. are classified as having continuous, discontinuous or sporadic permafrost. It is the continuous type that so seriously affects health programs, for even if the surface thaws for a short period, the frozen ground beneath may extend permanently to a depth of several thousands of feet.

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Basic elements in the maintenance of health are the disposal of human waste and refuse, and the provision of safe pure water for human consumption. These essential services are very difficult to provide in a permafrost area for sewer and water lines freeze and bacterial action, essential in decay of waste, is inhibited. Ill health can be directly related to improper sewage disposal and an absent or unsafe water supply. When pure water sources are found in wells, the problems of freezing make distribution difficult and expensive. Pre-heating and the maintenance of continuous flow have permitted some communities to install successful water distribution systems. It is reported that many other ingenious innovations have been and are being tried to overcome these obstacles. Not until these basic elements of safe and comfortable living have been successfully met can we expect any appreciable migration to the Arctic.

Residents of the Subarctic use cesspools and septic tanks for sewage disposal and have safe water supplies. Larger communities have sewage treatment plants and central water supply systems. Sanitary fills effectively take care of refuse. Thus the hazards to health of poor sanitation are minimized or removed. These basic services permit construction of modern comfortable convenient homes, apartments, schools, hospitals and business establishments which attract and hold people. But of even more importance, practically all essential medical care is available in the so-called subarctic regions. Excellent modern hospitals, well equipped and staffed, are located in all populated areas and well trained and experienced physicians have settled in most communities of over 1,000 people. In the larger centres the major specialties of medicine, surgery, obstetrics and pediatrics may be found, and of particular importance is the general competence of the practitioners to meet routine, as well as emergency situations. The vast distances reduce the immediate availability of general or specialized care in isolated areas, but with the present rapid and frequent air flights it rarely occurs that patients cannot be reached for treatment or, in unusual cases of emergency, be transferred promptly to specialized hospitals in the lower States or Provinces. A major contribution to the maintenance of good health in the last fifteen years has been the services of the well organized and staffed Public Health Departments.

In reviewing the special health problems and some relevant statistics concerning health in the Arctic (the permafrost areas) one cannot avoid making two important observations. The first is that there have been magnificent accomplishments during the last fifteen years in improving health conditions; the second is that there remains much more to be done. The occurrence of illness and disability must be reduced. This will require a continuing all out effort with years of study, experimentation and research, and the application of knowledge already available to scientists who are working in the Arctic.

All the conditions associated with poor hygiene such as infestation with lice and mites, skin diseases, infections of scalp, eyes, body and extremities are common in permafrost areas. Respiratory infections are frequent; there

is evidence of total or partial blindness (phlyctenular kerato conjunctivitis), bone tuberculosis, tonsillitis and chronic otitis media.

*Enteric diseases* are a serious problem. More than half the residents of northern villages under observation for a year had diarrhea during that time; most of them were children. *Shigella* and salmonella were found as causative agents. In February 1965 it was reported that the majority of enteric diseases in children under two years of age in Kotzebue were associated with enteropathogenic *Escherichia Coli*. In the same month, at the Public Health Service Medical Center in Anchorage, daily samples of all new admissions under the age of five demonstrated that 15 per cent harboured a pathogenic *Escherichia Coli*. A substantial number of new cases of diarrhea, dysentery, gastroenteritis, infectious hepatitis are listed every month in the epidemiological report of the Division of Public Health, Alaska. The *reported* cases number in the thousands every year, but the number of those unreported is known to be much greater. Typhoid has been reported in Alaska and in the Canadian Arctic where, in 1940, over 10 per cent of the Eskimos in the Cumberland Sound area died from the disease. These examples emphasize the hazards of poor sanitation and grossly inadequate housing.

The reliance upon both domestic animals and wild life for transportation and food in the North adds other groups of diseases to those already mentioned. The prevalence of fish tapeworm was reported as being as high as 33 per cent among Eskimos from 7 villages in Western Alaska. An even higher prevalence, 77 per cent, was reported for Port Harrison, Quebec. Numerous outbreaks of trichinosis have been noted and attributed to marine mammals, bears and rats.

Hydatid disease is endemic in Northern Canada, Alaska and other high northern latitudes. It is estimated that 4 per cent of the population in Alaskan villages may be infected. Brucellosis has been found among reindeer and caribou in Alaska and Canada and cases of human brucellosis have been confirmed although not in great numbers.

*Infant mortality* (the number of deaths under one year of age per 1,000 live births) is a sensitive measure of achievement in the control of environmental factors as related to disease. Infant death rates for the Alaskan native (Eskimo and Indian) were 95.3 in 1950; 70 in 1958; 68.2 in 1960; 59 in 1962 — or 3 times as high as the non-native rates. In the Northwest Territories of Canada the overall infant death rates were 129.3 in 1959; 144.4 in 1960; 111.0 in 1961; 119.9 in 1962; 104.2 in 1963.

These few significant statistics clearly indicate that much needs to be done to improve the environment into which an infant is born. It also points to the need for more public health services, such as good sanitation, prompt immunization, availability of necessary hospital facilities for both mother and child during these critical periods of life.

*Tuberculosis* has been well named the Scourge of the North. A study during 1926-30 revealed that the tuberculosis death rate among Alaskan natives was 655 per 100,000 population. In 1938 the recorded rate was 650 per 100,000. These figures indicate that tuberculosis was at epidemic

proportions and showed no improvement for many years. This was indeed a shameful situation for measures of control were available but were simply not used. Not until after World War II, when the Alaskan Legislature established a Department of Health and authorized a Tuberculosis Control Program, was an effective all-out effort made to curb this epidemic of tuberculosis. The Federal Government recognized its responsibility about that time, and with very substantial assistance in supplying personnel and facilities success was assured. The dramatic change was noted in the 1950's when the impact of the treatment program began to show results. In 1952 the rate per 100,000 native population was 500.7 compared with 655.9 in 1951. By 1964 the rate had dropped to 8.5!

Although this successful control of tuberculosis in Alaska is one of the bright spots in medical history it continues to be the number one disease problem even today. This conclusion comes from the fact that the present incidence is six times the average rate for the nation, the morbidity rate for 1964 being 135/100,000. The total State tuberculosis case register in 1952 listed 5,814 cases but by 1962 it had been reduced to 1,552 increasing in 1964 to 1,665. A most encouraging fact, however, is that the majority of cases are now classified as primary or minimal whereas 15 years ago new cases were first discovered in the far advanced or moderately advanced stages.

In Canada it is the same story. In the 1964 annual report of the Department of National Health and Welfare we read, "Tuberculosis has always posed a particularly serious problem amongst Indians, so serious that, at one time, this one disease threatened the continued existence of the race. Consequently, the control and treatment of this disease has been a major concern . . . As a result . . . the mortality rate has been drastically reduced, deaths from active tuberculosis amongst the Indian population as a whole now being 17 per 100,000 of population. The majority of deaths occur amongst elderly persons with long established severe disease, males and females being almost equally affected. The incidence of new cases has also been dramatically reduced but still persistently stands at some ten times the national rate."

Corneal scars resulting from phlyctenulosis probably due to a hypersensitivity to the products of the tubercle bacillus cause total and partial blindness to a shockingly high degree. Some studies reveal scarring ranging from 28 to 45.4 per cent in some groups of Eskimos and Indians. To correct this serious disability more research and study need to be carried out.

The respiratory diseases, pneumonia and bronchitis constantly take their toll in the North. All the virus diseases such as measles, chicken pox, influenza frequently become epidemic and seem to be disastrous for non-white groups. The advent of immunization for measles and poliomyelitis will offer protection provided, of course, that machinery for their administration exists.

In discussing the Arctic one cannot overlook the high rate of accidents causing disability and death. As an example, it was reported in 1963 that accidents were responsible for 55 per cent of the total mortality from all causes over the age of one year in the Yukon. Here too is a challenge to

public health personnel of the future since education and improved methods of living have been successful in reducing accidents in other areas of the world.

The Arctic is indeed fraught with major challenges to improve man's environment and reduce his disability and loss of life. As has been illustrated above much progress has been made and one must give recognition to this progress.

In Canada the Federal Government through the medical services of the Department of National Health and Welfare: provides medical treatment directly by full-time salaried medical or nursing officers, or by hiring the services of locally available physicians and specialists on a fee-for-service basis; ensures that Indians are not left, by reason of remoteness or their chosen way of life, in ignorance of modern ideas on how to protect and promote health. This is accomplished mainly by a staff of public health field nurses whose primary function is educational, visiting each house to instruct and demonstrate those health promoting practices and to offer the protection of vaccination against such diseases as smallpox, diphtheria, tetanus and poliomyelitis.

Many Indian communities are becoming increasingly health conscious and are now organizing health committees, passing sanitary and health by-laws and organizing co-operation with hospital insurance plans. The Department strongly encourages this development and where any Indian band makes any effort at this kind of self help, readily affords any necessary advice or assistance.

The establishment in the Canadian Arctic and Subarctic of hospitals, clinics, nursing stations and health centres has brought great advances in health. The hospitals at Inuvik, Whitehorse, Frobisher Bay, Moose Factory and others offer good medical care to the people of the North.

Under the National Health Grants program the Northwest Territories and the Yukon are receiving annually increasing amounts for hospital construction, in addition to the general health grants. It was reported in 1964 that in the previous year the "Medical Services operated eighteen hospitals, forty-four nursing stations, eighty-three health centres, forty-one health stations, forty-two clinics mainly for Indians and Eskimos . . .".

The greatly improved health in Alaska is the result of an extraordinary cooperative effort between governmental and non-governmental agencies. The Federal (U.S.) Public Health Service joined with the Alaska Department of Health in 1949 in a determined effort to correct the deficiencies and institute a long range service and research program, through the Arctic Health Research Center. The success of these joint efforts is measured in the greatly improved health status of all residents of the Arctic and Subarctic. A remarkable program of case finding, education, BCG immunization, ambulatory chemo-therapy and patient hospitalization broke the scourge of tuberculosis in a little over ten years. Itinerant public health nurses served throughout the Arctic and offered much toward the success of these programs. During this phase of intense activity another major contribution

came from the churches, voluntary groups and local communities. As in Canada the key to reaching the successful goals thus far has been the remarkable participation of the Eskimos and Indians themselves. Through careful evaluation of their culture, customs, ways of living and understanding, they have become involved in the service programs.

The Sanitary Aid program is illustrative of this active participation. It was the device by which a program of training could become continuous in the villages. Again, the success of B.C.G., chemotherapy, x-ray surveys and all immunization studies is directly attributable to the willingness of the people.

A major contribution toward the achievement of improved health services in Alaska over the past fifteen years has been the substantial increase of hospital beds. For example, in 1945 there were only 70 beds for tuberculosis patients but by 1953 this was increased to 796 beds. This was accomplished through 1) The construction of new public health hospitals (Mount Edgecumbe and Anchorage), 2) Renovation of existing PHS Hospitals (Point Barrow, Kotzebue, Bethel and Dillingham), 3) Conversion of abandoned Military Hospitals (Skagway, Seward, Mount Edgecumbe), 4) Private church or community hospitals, both new and renovated (Nome, Palmer, Anchorage, etc.).

Many health centres and clinics too numerous to list here have been constructed and staffed in these northern countries. Often their isolated but strategic location has been an invaluable resource for the delivery of many essential services.

*What of the future?* What are the prospects for the Arctic in the further improvement of health services so essential to the development of vast areas? There is very definite evidence that both Alaska and Canada are moving ahead with definite and positive action.

In the fall of 1965 on the campus of the University of Alaska near Fairbanks, *The Alaska Water Laboratory* is expected to open. The structure contains 25,000 sq. ft. of space and with all equipment has been estimated to cost approximately \$2,500,000. A staff of sixty-two, under a Director, will operate the laboratory. Programs will largely be concerned with water quality problems peculiar to the arctic environment.

Some of the more important are:

1. Study of low temperature influences on conventional primary and secondary treatment processes and application of waste stabilization ponds for municipal and industrial wastes.
2. Development of criteria for desirable aquatic life under cold weather conditions in connection with water quality control.
3. Establishment of base lines of water quality for streams, estuaries and coastal waters.
4. Development of techniques for the treatment of water containing iron and manganese.

This will bring a much needed research facility into the Arctic actually in the permafrost area and the prospects of solving some of the problems can now be much more encouraging.

At present under construction at the University of Alaska is an imposing building to house the biological sciences. Here basic science teaching and research, as applied to arctic and subarctic life, will be continued on a much larger scale.

Another major facility under construction since April 1965 is a new Arctic Health Research Center, to cost a total of \$3,750,000. This program, now underway, is housed at Anchorage, Alaska, but with its new location on the campus of the University of Alaska it becomes part of a complex of facilities that will have a tremendous potential for the future solution of the problems of the North.

In Canada there is also a determined plan for the future. A Royal Commission was appointed to study the health services in the North and following are selected quotations from their report, 1964-65:

"The inescapable conclusion in regard to health services is that there must be a comprehensive master plan for the speedy implementation of organized services capable not only of dealing with emergencies such as epidemic outbreaks, but providing a permanent and continuing surveillance and treatment service."

"...We have no illusions that it is going to be an easy task but we are convinced that Canada can do it, can afford it and, in fact, must do it now to make up for the time lost and opportunities missed. We cannot overemphasize the need for development on a broad scale of social and economic action of which health services are only a part but the part this Commission is most immediately concerned with."

"...In order, however, to bring these services to the wide areas of the Territories which cannot develop the type of community services we have described in the foregoing chapters of our Report, additional measures are necessary. Bearing in mind the great and compelling need for a comprehensive, imaginative and far-reaching approach to meeting the health and related requirements of the people in Canada's northland, we make the following recommendations...."

The report then lists a series of plans boldly to meet the needs of Canada's Arctic. They are comprehensive and complete and are worthy of study directly from the report of the Royal Commission on Health Services.

In closing one is compelled to observe, 1) the extraordinary gravity of the health situation in the North American Arctic as it was in the past and still is today, and 2) the opportunity and challenge for improvement that exist in the future.

But Alaska and northern Canada are not alone in their problems, and now that all countries whose territories extend into the Arctic are exchanging views on the scientific and technological potentialities of the North, it would seem to be timely to convene an international Conference on Arctic Health. It is believed that by sharing medical data and discussing plans in that field on a circumpolar basis, developments over the entire Arctic would progress more rapidly.