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**Disease pattern in Upernavik in relation to housing conditions and social group**

*Peter Bjerregaard and Beth Bjerregaard*



**Man &  
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**8 · 1985**

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# Disease pattern in Upernavik in relation to housing conditions and social group

*Peter Bjerregaard and  
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# Disease pattern in Upernavik in relation to housing conditions and social group

PETER BJERREGAARD and BETH BJERREGAARD

Bjerregaard, Peter and Bjerregaard, Beth 1985. Disease pattern in Upernavik in relation to housing conditions and social group. *Meddr Grønland, Man & Soc.* 8: 18 pp, Copenhagen 1985-10-23.

From April 1979 to March 1980 all 2673 contacts between the 836 inhabitants of Upernavik town, West Greenland, and the local medical officers were recorded together with information on social conditions and housing standard. Housing conditions included size of house, space per inhabitant, heating, and water supply; pronounced differences were observed between Greenlanders and Danes of Upernavik and between different social groups of Greenlanders.

In comparison with general practice in Denmark the following disorders were less frequently registered in Upernavik: Infectious children's diseases, cancer, diabetes, minor mental disorders, high blood pressure, coronary artery disease and urinary infections. On the contrary, gonorrhea, chronic otitis, impetigo and accidents were more frequently encountered in Upernavik.

Danes of Upernavik had a low rate of admissions to hospital compared with Greenlanders of corresponding social group, and low incidences and contact rates for all diseases.

In Greenlanders of Upernavik the rate of admissions to hospital for all causes, as well as contact rates for skin and respiratory infections, were highest in the lowest housing standard and social groups and in the smallest households.

Contact rates for all causes together and for accidents were similar in the socio-economic subgroups.

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## Introduction

The general disease pattern in Greenland, including diseases of patients not admitted to hospital, has not been studied for more than thirty years. Bertelsen (1935, 1937, 1940, 1943), in his classic study, described a disease pattern very different from today's. The annual report from the Chief Medical Officer in Greenland contains information on causes of death, diagnoses of patients admitted to hospital, and certain notifiable infectious diseases, but not on the majority of out-patient contacts with the health service. It was therefore considered valuable to describe the overall disease pattern in a Greenlandic town and to compare this pattern with that of Danish general practice.

An epidemiological study on the incidence of some chronic diseases in Upernavik during 1950-74 (Kromann & Green 1980) showed that the overall incidence of cancer was comparable to that of Denmark, but with a different anatomical distribution, that the incidences of stroke and grand mal epilepsy were higher than in Denmark, whereas the incidences of peptic ulcer, coronary artery occlusion, psoriasis, bronchial asthma, diabetes, and toxic goiter were lower than in Denmark, but

only patients admitted to hospital were recorded. During the same period a considerable reduction in overall mortality was observed (Green & Kromann 1983). This was primarily attributed to the eradication of tuberculosis.

Several investigations have demonstrated how housing conditions and other social factors influence the disease pattern. Few studies, however, concern the Arctic. Therefore in Upernavik the disease pattern of groups characterized by different housing conditions and social status were compared.

From et al. (1975) conducted a large interview study on social problems in Greenland in 1972-73. The 609 interviewed persons, of which 576 were born in Greenland, were representatives of towns and settlements in West Greenland southward from Disko Bugt. Up to 21% of the interviewed Greenlanders stated that they were troubled by nervous symptoms such as restlessness, sleeplessness, fear, depression, etc. Women and persons from the lowest socio-economic group had most nervous complaints.

In a study from Southwest Greenland, Berg & Adler-Nissen (1976) examined 1286 inhabitants from the town of Narsaq and settlements in the districts of Narsaq and

Qaqortoq (Julianehaab). The investigation was based on interviews and hospital records, and it was concluded, that people with poor housing conditions had more attacks of common cold and otitis than people with good housing conditions. No association between morbidity due to tonsillitis or gastroenteritis and housing conditions was demonstrated.

Hobart (1976) investigated the influence of certain socio-economic and behavioural factors on morbidity in Inuit children from arctic Canada. An association was observed between increased morbidity and, i.e., poor quality of housing, crowding, lack of central heating, and lack of tap water in the house.

## Housing conditions in Greenland

The houses of the Thule culture were small and rounded, dug into the ground, often two or three together with a common passage. They were made of stone, turf, driftwood, and whalebone, and had a single room with paved floor, a platform, and a deeply sunk passage. Often there were indoor cooking places in offshoots from the front of the house (Mathiassen & Holtved 1936, Gad 1970).

In the 17th century, the period of European whaling, the small rounded houses were replaced by small four sided houses and subsequently by large, trapezoid common houses, also with sunk passage (Mathiassen & Holtved 1936). This longhouse, which was the most common form of dwelling at the beginning of the Danish colonization in Greenland in 1721, was given up in West Greenland in the second half of the 19th century, in East Greenland about 1940. The reasons for the adoption of the new type of house by the Greenlanders has been suggested to be alterations in their subsistence patterns secondary to climatic changes (Petersen & Rix 1983).

The longhouses were 3–4 m in breadth and up to 14 m in length, depending on the number of inhabitants (Mathiassen 1931 b). In Upernavik ruins have been found measuring 12–45 m<sup>2</sup> – on average 23 m<sup>2</sup> (Mathiassen 1930, 1931 a). It is possible to form a rough estimate of the space per inhabitant in the longhouses of Upernavik. According to the census of 1806, 364 persons were living in 20 longhouses in the district of Upernavik, an average of 18.2 persons in each (Bryder et al. 1921). The actual size of these houses is not known, but if it is assumed that they measured 23 m<sup>2</sup> on an average as did the ruins of longhouses in Upernavik district, they would offer 1.3 m<sup>2</sup> per person.

In the middle of the 19th century, in West Greenland, the longhouses were replaced by small, rectangular stone and turf houses without sunk passage, which remained the most common house far into this century. The replacement of the longhouses was paralleled by a decreasing number of settlements, which in return became more permanent and larger, with several houses

(Petersen 1974). The houses from this period have been described as belonging to one of four types. Type I was the traditional small, rectangular house with walls of stone and turf mentioned above. The floor, walls, and ceiling of type II were boarded to various degrees. Type I and II had only one room. Type III was half-timbered, supplemented with a wall of stone and turf, had a roof with high pitch, and contained 1–2 rooms and often a kitchen. Type IV was built entirely of wood, had up to 3 rooms, and a kitchen. In 1915–19 15% of the houses in West Greenland were type I, 59% type II, 17% type III, and 9% type IV (Amdrup et al. 1921).

The report of the Greenland Commission of 1950 gave a high priority to housebuilding for sanitary and social reasons, and there has been very intensive housebuilding in Greenland ever since. Houses built after 1950 were initially wooden single-family houses, but from around 1970 large apartment buildings of concrete have been constructed. In recent years, new houses have increasingly been built as linked single-family houses. In Upernavik so far only wooden houses for one or two families have been built. Administrative and economic aspects of post-war housebuilding in Greenland have been reviewed by Kreiner (1980).

Previous measurements of housing conditions in the whole of Greenland and in Upernavik are outlined in Tables 1 and 2. Not all investigations give direct information on housing space in square metres per inhabitant. The dimension used is often cubic feet per person-unit, and the results of the investigations in question have been converted estimating the floor-to-ceiling height and the age composition of the household. In connection with the replacement of the longhouse by the small, square stone and turf houses, the decrease in the size of households was paralleled by a decrease in the size of the houses, and the amount of space per individual remained constant. In the 20th century the size of the houses has been continuously increasing, which in connection with a slightly decreasing size of households has resulted in a significant increase in space per inhabitant.

The social differences in the amount of space per individual have been pronounced during the whole of this century. In 1906 employees of Upernavik had 1.9 m<sup>2</sup> at their disposal and hunters only 1.0 m<sup>2</sup> (Bertelsen 1907). Both in 1935 and 1955 the figures were 6 m<sup>2</sup> and 3 m<sup>2</sup> respectively (Bertelsen 1937, official count of dwellings 1955).

During recent years Danes have made out a considerable proportion of the population. In 1976, according to official statistics, the houses of persons born outside Greenland offered 25 m<sup>2</sup> per inhabitant which was twice as much as the average for persons born in Greenland.

## Heating

In the polar climate of Greenland the availability of fuel is probably the single most decisive factor in determin-

Table 1. Investigations on housing conditions of native Greenlanders. § = calculated by the present author.

Source	Year	Number of houses investigated	Locality	Size of houses	Size of households	Space per individual
Thule and Inugssuk culture (AD 900–1500)						
Mathiassen (1931b)		57 Single, double, and triple houses	Kangaamiut	7–20 m <sup>2</sup>	–	–
Mathiassen (1934)		7 single houses 7 double houses 1 triple house	Disko Bugt	Single 10 m <sup>2</sup> (6–16) Double 18 m <sup>2</sup> (15–21) Triple 30 m <sup>2</sup>	–	–
Common houses of whaling period and early colonial period						
Mathiassen (1934)	1793	1	Illorsuit	19 m <sup>2</sup>	22	0.9 m <sup>2</sup>
Kayser (1840)	1845	–	Ilulissat	–	4–10 lamps	1.7 m <sup>2</sup> § (1.1–3.1)
Colonial period from 1850						
Ryberg (1894)	1883–87	66	West Greenland	11.6 m <sup>2</sup> (2.9–25)	8.3	1.4 m <sup>2</sup> (0.5–3.8)
Bertelsen (1937)	1902–03	276	West Greenland	12.8 m <sup>2</sup> §	7.5	1.7 m <sup>2</sup> § (0.5–64)
Bertelsen (1907)	1906	109	Uummannaq	9.5 m <sup>2</sup>	6.6	1.4 m <sup>2</sup>
Svendsen (1930)	ca. 1928	150	Aasiaat	14.6 m <sup>2</sup> §	7.0	2.0 m <sup>2</sup>
Bertelsen (1937)	1935	513	West Greenland	18.6 m <sup>2</sup> §	5.3 §	3.5 m <sup>2</sup> § (0.9–55)
Period after 1953						
Official count of dwellings	1955	4225	Greenland	22 m <sup>2</sup>	5.5	3.9 m <sup>2</sup>
Official count of dwellings	1965	5804	Greenland	42 m <sup>2</sup>	5.5	7.6 m <sup>2</sup>
Official count of dwellings	1976	8526	Greenland	54 m <sup>2</sup>	4.3	12.6 m <sup>2</sup>
North and East Greenland						
Holtved (1944)	Thule culture	10 single houses 5 double houses 2 triple houses	North Greenland	Single 7 m <sup>2</sup> (5–11) Double 11 m <sup>2</sup> (7–13) Triple 14 and 15 m <sup>2</sup>	–	–
Holm (1883)	1884	1 (longhouse)	Ammassalik	38.6 m <sup>2</sup>	38	1.0 m <sup>2</sup>
Thalbitzer (1914)	1905–06	11	Ammassalik	36 m <sup>2</sup> (21–56)	24.6 (11–41)	1.5 m <sup>2</sup> (0.8–2.1)
Bertelsen (1937)	1907	10	North Greenland	9.1 m <sup>2</sup> §	4.5 §	2.0 m <sup>2</sup>
Høygaard (1938)	1936	35	Ammassalik	14.9 m <sup>2</sup> (6–26)	11.1 (4–21)	1.4 m <sup>2</sup> § (0.7–2.2)

ing the size of dwellings. In the 19th century and earlier there was about 1.5 m<sup>2</sup> available space per individual both in the large longhouses and in the small houses that replaced them. This probably represented an equilibrium between climate, need of space, and catch of seals and other animals providing combustible fat.

The traditional means of heating were soapstone lamps and blubber. The heating of a type II house of about 15 m<sup>2</sup> with 9 inhabitants, i.e. 1.7 m<sup>2</sup> per person,

required 1.2 kg blubber or cod liver oil per day from October to May, the heat production of the inhabitants accounting for one third of the total heat requirement (Høygaard 1938). Lack of blubber was not uncommon after a period of bad seal catch and people had to move together in fewer houses to keep warm. The introduction of stoves, fired by shrubs, driftwood, and coal, and a reliable supply of coal were prerequisites for the use of larger houses with fewer inhabitants.

Table 2. Investigations on housing conditions of native Greenlanders of Upernavik. § = calculated by the present author.

Source	Year	Number of houses investigated	Locality	Size of houses	Size of households	Space per individual
Thule and Inugssuk culture						
Mathiassen (1930)		5	Upernavik district	appr. 10 m <sup>2</sup>	—	—
Common houses of whaling period and early colonial period						
Mathiassen (1930, 1931a)	17.–18. century	10	Upernavik district	23 m <sup>2</sup> (12–45)	—	—
Bryder et al (1921)	1806	20	Upernavik district	(23 m <sup>2</sup> ) (estimated)	18.2	1.3 m <sup>2</sup>
Colonial period from 1850						
Mathiassen (1931b)	1850–1900	4	Inussuk	7 m <sup>2</sup> (5–9)	—	—
Bertelsen (1907)	1906	78	Upernavik district	7.7 m <sup>2</sup>	6.7	1.2 m <sup>2</sup>
Bertelsen (1937)	1935	67	Kangersuatsiaq Aappilattoq	11.5 m <sup>2</sup> §	4.4 §	2.6 m <sup>2</sup> §
Period after 1953						
Official count of dwellings	1965	109	Upernavik town	37 m <sup>2</sup>	5.3	6.9 m <sup>2</sup>
Official count of dwellings	1976	147	Upernavik town	53 m <sup>2</sup>	4.5	11.7 m <sup>2</sup>

In 1870, 38% of the houses in Greenland were furnished with stove while the rest were heated by the traditional lamp. By 1935 almost all houses in West Greenland were heated by stove, except in Upernavik district in which blubber fired soapstone lamps were still the only means of heating in 10–20% of houses (Bertelsen 1937). After 1950 stoves were increasingly replaced by central heating.

## Material and methods

Upernavik town is situated on the west side of a small island in the archipelago off the west coast of Greenland at 72°47'N. The climate is polar with an annual mean temperature of –6.4°C, and through nine months the mean temperature is below 0°C. Upernavik town is the administrative centre of Upernavik district, which had 2117 inhabitants in 1979, according to official statistics, living at 11 inhabited places.

The population studied were the inhabitants of Upernavik town on October 1, 1979, and children born during the period of study, which was from April 1, 1979, to March 31, 1980. The population was defined according to official lists, corrected according to the files of the hospital and the interpreter's knowledge of everybody in town. Temporary workers and visitors were not included in the study.

Information on housing conditions comprised size of

house, amount of space per individual, heating installation, and water supply, and was collected from the files of the municipality and of Greenland Technical Organisation, supplemented by unstructured interviews. The population was divided into three groups according to housing standards. Group 1 comprised persons living in houses of at least 60 m<sup>2</sup>, offering more than 10 m<sup>3</sup> per person, and equipped with both central heating and tap water. Group 3 comprised persons living in houses smaller than 80 m<sup>2</sup>, offering 15 m<sup>2</sup> or less per person, and with neither central heating nor tap water. Group 2 was the rest.

Information on social conditions comprised age, sex, and ethno-cultural grouping of individuals, and size and social grouping of households. Information on social conditions was collected from the files of the hospital supplemented by interviews. The ethno-cultural classification of the population as Greenland/Dane did not present any difficulties, as everyone was known personally. The official classification of persons in those born in Greenland and those born outside Greenland was not used. Mixed children were classified as Danes. For social classification the system of the Institute for Social Research in Copenhagen was used (Kamper-Jørgensen et al. 1980, Enevoldsen et al. 1980). By this system a person is classified according to education, number of subordinates, and whether he is independent, or salaried or wage-earning employee. Social groups I–II contain salaried employees with more than 10 subordinates,

university graduates, teachers. Social group III contains salaried employees with 1–10 subordinates, smaller independent craftsmen and tradesmen, assistant health workers, nurses. Social group IV contains skilled workers, hunters, salaried employees without education or subordinates, and social group V unskilled workers and persons living by a combination of any odd job and small-scale hunting. All members of a household were classified according to the highest social group attained by any of the members. Persons from households of which no member had any occupation, e.g. pensioners, were considered unclassifiable.

During the period of study all contacts between the population and the two medical officers of Upernavik were recorded. Consultations by visiting specialists, nurses or the Greenlandic assistant health workers were not included in the study. Final diagnoses were coded according to "Praksis Sygdoms Klassifikation" (PSK) (Krogh-Jensen 1976) with some modifications (Nordentoft & Reeslev 1979). PSK is a Danish system for classifying diseases, designed for use by general practitioners. It is to a certain degree similar to the ICD classification of WHO, classifying diseases primarily by the affected organ system, but – hierarchically constructed – it allows classification of cases which are not thoroughly investigated (cf. appendix).

Infections were diagnosed clinically and only occasionally bacteriological examination was performed. In the section on socio-economic conditions and disease, "skin infections" also include infections secondary to wounds; "respiratory infections" also include infections of ear, nose, and throat.

For each disease two measures of morbidity have been used: The percentage of persons with at least one medical contact during the year of study, also referred to as incidence, and the total number of contacts per person during the year of study, referred to as contact rate. The contact patterns of Upernavik and Aarhus, Denmark, were compared after indirect standardization for age and sex (Mausner & Bahn 1974). The age and sex specific contact rates in Aarhus have only been published for entire PSK groups. Therefore, when analysing specific disorders or groups of disorders that were not identical with the PSK groups, only the crude contact rates could be compared.

The contact patterns of subgroups of the population of Upernavik were compared after direct standardization for age and sex; as the number of diseased persons in each subgroup was small, only three age/sex groups were used for standardization, i.e. children aged 0–14, adult women, and adult men. For each socio-economic subgroup the incidences and contact rates of these age/sex groups were applied to a standard population, in this case all Greenlanders of Upernavik.

## Statistics

A log linear model was used for evaluation of differ-

ences between standardized incidences, applied to the number of diseased persons in each group.

A modified  $\chi^2$  test was used for evaluation of differences between standardized contact rates, being applied to the number of contacts in each group. The variance assumption of the  $\chi^2$  test equals the Poisson model, but variables such as contacts with medical officers during one year do not occur independently. The inter-person standard deviation of such a variable must be expected to be larger than the standard deviation of a Poisson distribution. It can be shown that if the distribution of such a variable has an inter-person standard deviation =  $k$  times the one expected under the independence assumption (Poisson model), then the  $\chi^2$  for comparison of subgroups equals the usual  $\chi^2$  divided by  $k^2$ .

Standard deviations of actual distributions,  $s$ , were calculated for each disease variable using the formula

$$s^2 = \frac{\sum x^2 - n\bar{x}^2}{n - 1}$$

where  $n$  and summation refer to the entire population including those who did not have any contacts.

$$k^2 \text{ was thus } \frac{s^2}{\bar{x}}$$

$k^2$  varied between 1.6 (admissions to hospital due to all causes) and 3.9 (out-patient consultations due to all causes).

## Results

The population consisted of 836 persons, 737 Greenlanders and 99 Danes. There is very great difference between Greenlanders and Danes of Upernavik as regards housing conditions and other social factors, and as the majority of Danes spend few years in Greenland all results of the present study will be presented separately for Greenlanders and Danes, and emphasis will be laid on the study of Greenlanders.

The age and sex distribution of the Greenlandic population of Upernavik town was similar to that of the whole of Greenland and the average age was considerably lower than that of the population of Denmark (Table 3). Twelve percent of the population of Upernavik town were Danes according to the classification used in this study. According to official statistics 11.4% were born outside Greenland. In Greenland as a whole, 18% of the population were born outside Greenland. The Danish population of Upernavik town was younger than the Greenlandic and there were considerably more adult men than women.

In 1979–80 all the houses of Upernavik town were wooden single or double-family houses. Most of the houses had been built after 1950, and two thirds of all houses had been built after 1960. All houses had electri-

Table 3. Age and sex distribution of the Greenlandic population of Upernavik and of the whole of Greenland compared to that of the population of Denmark (%).

Age	Males			Females		
	Upernavik	Greenland	Denmark	Upernavik	Greenland	Denmark
0	1.1	1.0	0.6	0.9	1.0	0.6
1-6	5.3	5.3	4.0	5.0	4.9	3.9
7-14	13.0	10.5	6.2	11.0	9.7	5.9
15-44	24.0	26.0	22.1	23.3	24.2	21.1
45-64	6.4	6.5	10.4	5.6	6.8	10.9
65+	1.5	1.7	6.1	3.1	2.5	8.3

Table 4. Housing conditions in Upernavik town (1979-80), the whole of Greenland, and Denmark.  
(a) Official statistics of 1976. (b) Official statistics of 1980.

	Greenlanders of Upernavik town	Greenlanders of the whole of Greenland (a)	Danes of Upernavik town	Denmark (b)
Size of dwelling (m <sup>2</sup> )	59	54	91	107
Household size	4.4	4.3	3.1	2.5
Housing space (m <sup>2</sup> per person)	13	13	30	43
Persons with central heated house	64%	54%	98%	93%
Persons with tap water in house	51%	49%	99%	(appr. 100%)
Housing standard group 1	30%	—	95%	—
Housing standard group 2	43%	—	5%	—
Housing standard group 3	27%	—	0	—

city and as there was no sewerage none had WC. Garbage was collected from the houses and deposited on the dump without further treatment. Night soil was collected in pails and treated in the same way as the garbage. Sometimes both garbage and night soil was just thrown outside the door, serving as food for the sledge dogs. The heating installation was central heating with oil as fuel for 64% of Greenlanders. 21% had oil-fired stove and 15% coal-fired stove. 98% of the Danes lived in central heated houses, 2% in houses with oil-fired stove and none in houses with coal-fired stove.

There are no natural freshwater reservoirs on the island of Upernavik. The waterworks of Upernavik produced a limited amount of freshwater by desalting sea-water. This was supplemented in summer by water transported by boat from a stream on a nearby island. The water was treated at the waterworks and distributed to the consumers by a tank lorry. 51% of Greenlanders had water delivered directly to a tank in the house from where it was distributed in the house by ordinary piping. The rest had to fetch water from tap posts situated at various locations in the town. 99% of the Danes had water delivered in the house. The waste water left the houses through a short piping directly to the surroundings.

The average housing conditions of Greenlanders in Upernavik were similar to those of Greenlanders in the whole of Greenland; housing conditions of Danes living in Upernavik were not much different from housing

conditions in Denmark and far better than those of the Greenlanders (Table 4).

The distribution on family social groups of the population of Upernavik appears from Table 5. 92% of Danes belonged to social groups I-III compared with only 51% of Greenlanders. The upper social groups had significantly better housing conditions regarding all measures (Table 6).

Classification of the population according to housing standard and social group are two ways of systematizing socio-economic diversity. The resulting upper, medium and lower socio-economic groups, however, were not identical (Table 7). Only 45% of the population was classified with corresponding housing standard group and social group, i.e. with both highest, both medium or both lowest groups.

Table 5. Population of Upernavik town according to family social groups. 1979-80.

Social group	Greenlanders		Danes	
	No. of persons	%	No. of persons	%
I-II	62	8	48	48
III	312	42	44	44
IV-V	307	42	7	7
Not classified	56	8	0	0
Total	737	100	99	99



Table 6. Housing conditions of social groups. Households of which the head was Greenlander. Upernavik town 1979-80.

Social group	I-II	III	IV-V
Size of dwelling (m <sup>2</sup> )	91	64	52
Size of household	4.6	4.3	4.9
Housing space (m <sup>2</sup> per person)	19.7	14.9	10.6
Persons with central heated house	92%	81%	43%
Persons with tap water in house	79%	64%	32%

Table 7. Distribution of Greenlanders of Upernavik town according to family social group and housing standard, 1979-80. Inhabitants of old people's home not included. Number of persons.

Social group	Housing standard group			Total
	1	2	3	
I-II	42	20	0	62
III	132	139	41	312
IV-V	30	133	144	307
Not classified	11	15	12	38
Total	215	307	197	719

## Disease pattern

A total of 2673 contacts caused by disease or symptoms were recorded. The 737 Greenlanders had 2475 contacts, the 99 Danes 198 contacts, which equals an average rate of contacts per inhabitant per year of 3.4 and 2.0 respectively. In Aarhus, Denmark, a rate of contacts with general practitioners of 4.5 has been observed (Nordentoft & Reeslev 1979). 23% of the population of Upernavik had no medical contacts during the year of observation, i.e. 31% of the children, 7% of the adult females, and 20% of the adult males.

The contacts of the Greenlandic population of Upernavik with the health service can be described diagrammatically (Fig. 1). Of a total Greenlandic population in Upernavik of 737 persons, 79% were seen by a

medical officer during the year of study. These 584 patients had an average of 2.84 new episodes of disease, including the first contact on account of existing chronic diseases during the period of study, leading to a total of 1661 new episodes. Each episode resulted on an average in 1.36 out-patient consultations and 0.13 admissions to hospital, i.e. a total of 2256 out-patient consultations and 219 admissions to hospital. Thus, in the Greenlandic population of Upernavik, the incidence of new episodes of disease was 2.25, consultation rate 3.06, admission rate 0.30, and total contact rate 3.36, the values being expressed per person in the entire population and per year.

The contact rates of Greenlandic children, women, and men of Upernavik appear from Table 8. Women had higher rates of both out-patient consultations and admissions to hospital than both children and men.

The distribution on principal diagnostic groups according to PSK of all recorded contacts is shown in Table 9 separately for Greenlanders and Danes. Respiratory diseases, accidents, skin diseases, and diseases of the nervous system, eye, and ear accounted for nearly 50% of contacts in both Greenlanders and Danes.

For all age groups together the contact rates were almost similar in Upernavik and Aarhus, Denmark. There was, however, a marked decline with age in the ratios between contact rates in Upernavik and Aarhus in both men and women (Table 10). The high contact rate of Greenlandic children compared with Danish children was caused by a higher number of contacts due to diseases of the nervous system, eye, and ear, skin diseases, and accidents, partly balanced by a lower number of contacts due to infectious and respiratory diseases.

The total contact rate of Greenlanders aged 15-44 did

Table 8. Contacts per person of Greenlanders of Upernavik town with medical officers during one year (1979-80).

	Children	Women	Men	Total
Out-patient consultation rate	2.11	4.53	2.66	3.06
Admission rate	0.21	0.50	0.20	0.30

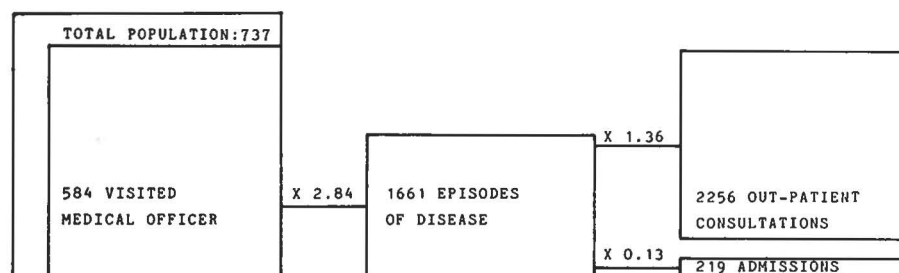


Fig. 1. Contact pattern of Greenlanders of Upernavik town with medical officers 1979-80.

Table 9. Main diagnoses of contacts with medical officers in Upernavik town (1979-80).

	Greenlanders			Danes		
	No. of contacts	%	95% confidence limits	No. of contacts	%	95% confidence limits
1. Infectious diseases	143	5.8	4.9-6.8	5	2.5	0.8-5.9
2. Neoplasms	20	0.8	0.5-1.2	6	3.0	1.1-6.6
3. Endocrine, nutritional, and metabolic diseases	2	0.1	0-0.3	11	5.6	2.8-9.9
4. Hematological diseases	0	0	0-0.1	1	0.5	0.01-2.8
5. Psychiatric diseases	39	1.6	1.1-2.2	10	5.1	2.4-9.3
6. Diseases of nervous system, eye, and ear	247	10.0	8.8-11.3	20	10.1	6.2-15.6
7. Cardiovascular diseases	64	2.6	2.0-3.3	11	5.6	2.8-9.9
8. Respiratory diseases	396	16.0	14.5-17.7	27	13.6	9.0-19.8
9. Gastrointestinal diseases	156	6.3	5.3-7.3	4	2.0	0.6-5.2
10. Genitourinary diseases	146	5.9	5.0-6.9	8	4.0	1.7-8.0
11. Diseases of pregnancy, delivery, and puerperium	64	2.6	2.0-3.3	1	0.5	0.01-2.8
12. Skin diseases	273	11.0	9.8-12.4	23	11.6	7.4-17.4
13. Musculoskeletal and connective tissue diseases	236	9.5	8.4-10.8	12	6.1	3.1-10.6
14. Congenital malformations	6	0.2	0.1-0.5	0	0	0-1.9
15. Diseases of the newborn	1	0.04	0-0.2	0	0	0-1.9
16. Other undesirable conditions	98	4.0	3.2-4.8	0	0	0-1.9
17. Accidents	300	12.1	10.8-13.6	19	9.6	5.8-15.0
18. Other	123	5.0	4.1-6.0	27	13.6	9.0-19.8
99. Symptoms	161	6.5	5.5-7.6	13	6.6	3.5-11.2
Total	2475	100.0		198	100.0	

Table 10. Ratios between contact rates of Greenlanders of Upernavik and population of Aarhus, Denmark, according to age and sex.

Age	Females	Males
0-14	1.25	1.15
15-44	1.00	1.08
45-64	0.79	0.83
65+	0.46	0.62
Total	0.93	1.02

not differ from Danish figures, a higher number of contacts due to infections, gastrointestinal diseases and accidents being balanced by a lower number of contacts due to endocrine, nutritional, metabolic, psychiatric and genitourinary diseases, and in women diseases of the nervous system, eye, and ear.

The low total contact rate in Greenlanders aged 45-64 was the outcome of a lower number of contacts due to endocrine, nutritional, metabolic, psychiatric, cardiovascular, and genitourinary diseases partly balanced by a higher number of contacts due to skin diseases and accidents. There were too few consultations in the group of Greenlanders over the age of 64 to permit an analysis of the lower contact rate in this age group.

Age and sex standardized contact ratios of Greenlanders of Upernavik in the main diagnostic groups of PSK appear from Table 11. Each of the diagnostic

Table 11. Indirectly standardized contact ratios in Greenlanders of Upernavik town according to diagnostic group (1979-80). 1.00 = Contact rate similar to that of Aarhus, Denmark. \* =  $p < 0.05$ .

Diagnostic group	Standardized contact ratio
1. Infectious diseases	1.13
2. Neoplasms	0.43*
3. Endocrine, nutritional, and metabolic diseases	0.03*
4. Hematological diseases	0*
5. Psychiatric diseases	0.27*
6. Diseases of the nervous system, eye, and ear	0.99
7. Cardiovascular diseases	0.41*
8. Respiratory diseases	0.88
9. Gastrointestinal diseases	1.33
10. Genitourinary diseases	0.62*
11. Diseases of pregnancy, delivery, and puerperium	3.72*
12. Skin diseases	1.97*
13. Musculoskeletal and connective tissue diseases	0.92
14. Congenital malformations	0.67
15. Diseases of the newborn	0.91
16. Other undesirable conditions	0.92
17. Accidents	2.07*
18. Other	0.45*
99. Symptoms	2.48*
All	0.97



Table 12. Crude contact rates per 100 persons per year of diseases less frequent in Upernavik town (1979–80) than in Aarhus, Denmark (1976–77).

PSK code	Disease	Contact rate Upernavik (Green- landers)	Contact rate Aarhus
1.2	Epidemic children's diseases	0.7	5.5
1.41.32	Warts	0.8	2.6
2.1	Malignant neoplasms	0.8	6.2
3.11	Diseases of thyroid gland	0	2.4
3.12	Diabetes mellitus	0	7.6
3.31	Obesity	0	4.3
4.1	Anemia	0	4.3
5.12 and 16.22	Minor mental disorders	9.6	30.3
6.11.4 and 99.32	Headache	4.7	15.2
6.32.1	Acute purulent otitis media	0.9	4.0
7.11	Essential hypertension	2.0	14.8
7.12	Ischaemic heart disease	0.3	14.9
8.12.1	Influenza	2.6	6.7
8.12.2	Acute bronchitis	1.1	7.5
8.21.11	Allergic rhinitis	0	4.1
8.22.2	Bronchial asthma	1.8	6.4
10.12	Urinary infections	5.0	10.6
10.42.6	Diseases of climacterium	0.3	8.0
12.31.2	Seborrheic diseases	0.3	2.1
16.11	Dependency of alcohol	0.3	1.4
99.27	Insomnia	0.5	5.2

Table 13. Crude contact rates per 100 persons per year of diseases more frequent in Upernavik town (1979–80) than in Aarhus, Denmark (1976–77).

PSK code	Disease	Contact rate Upernavik (Green- landers)	Contact rate Aarhus
1.51	Gonorrhea	8.7	0.8
6.32.3	Chronic purulent otitis media	6.0	0.1
12.11	Impetigo	9.9	0.9
12.31.11	Atopic eczema	2.3	0.7
17.	Accidents	40.7	21.0

groups of PSK is composed of a large number of diseases; Tables 12 and 13 give the crude contact rates for specific disorders, differing considerably between Greenlanders in Upernavik and the population of Aarhus, Denmark. Diseases of pregnancy, delivery, and puerperium were presumed to be more frequent in Upernavik mainly because of the different organization of the health services of Greenland and Denmark and were excluded from these tables.

### Socio-economic conditions and disease

In Table 14 the pattern of out-patient consultations and admissions to hospital in Danes of Upernavik is compared with that of Greenlanders of Upernavik belonging to social groups I–III. A significantly smaller proportion of Danes had out-patient medical contacts, each patient had fewer episodes of disease, but more contacts during a disease episode. The percentage of Danes admitted to hospital, too, was significantly lower than that of Greenlanders.

Three disease groups were studied separately because they were presumed to be particularly influenced by socio-economic factors (Table 15). Fewer Danes than Greenlanders suffered from skin infections, respiratory infections and accidents, and Danes had fewer contacts, especially due to skin infections and accidents.

The disease patterns of Greenlanders with different housing standard and household size, and from different social groups were analyzed in a similar way (Tables 16–21). Significantly more Greenlanders from the poorest housing standard group were admitted to hospital (Table 16). Incidences and contact rates for skin and respiratory infections and accidents were also highest in this group; a low morbidity due to skin infections in the

Table 14. Medical contacts during one year due to all causes. Danes and Greenlanders of social groups I–III, Upernavik town 1979–80. Adjusted for age- and sex differences. \*\* =  $p < 0.01$ ; \* =  $p < 0.05$ .

Ethnic group		Danes	Greenlanders (Social groups I–III)
<i>Out-patient consultations:</i>			
Persons with at least one contact	**	66%	83%
Disease episodes per patient <sup>a)</sup>		2.1	2.6
Contacts per disease episode		1.6	1.3
Contacts per person <sup>b)</sup>	**	2.2	3.0
<i>Admissions to hospital:</i>			
Persons with at least one admission	*	9%	19%
Admissions per patient <sup>a)</sup>		1.0	1.2
Admissions per person <sup>b)</sup>	**	0.1	0.2

a) calculated per person with at least one contact

b) calculated per person in the entire subgroup

Table 15. Medical contacts during one year due to certain diseases. Danes and Greenlanders of social groups I–III, Upernavik town 1979–80. Adjusted for age- and sex differences. \*\* =  $p < 0.01$ ; \* =  $p < 0.05$ ; (\*) =  $p < 0.10$ ; n.s. =  $p > 0.10$ .

Ethnic group		Danes	Greenlanders (Social groups I–III)
<i>Skin infections:</i>			
Persons with at least one contact	*	9%	18%
Disease episodes per patient <sup>a)</sup>		1.1	1.2
Contacts per disease episode		1.3	1.7
Contacts per person <sup>b)</sup>	(*)	0.1	0.4
<i>Respiratory infections:</i>			
Persons with at least one contact	*	17%	29%
Disease episodes per patient <sup>a)</sup>		1.3	1.3
Contacts per disease episode		1.5	1.2
Contacts per person <sup>b)</sup>	n.s.	0.3	0.5
<i>Accidents:</i>			
Persons with at least one contact	**	9%	26%
Disease episodes per patient <sup>a)</sup>		1.2	1.2
Contacts per disease episode		1.1	1.2
Contacts per person <sup>b)</sup>	*	0.1	0.4

a) calculated per person with at least one contact

b) calculated per person in the entire subgroup

Table 16. Medical contacts during one year due to all causes. Greenlanders from different housing standard groups, Upernavik town 1979–80. Adjusted for age- and sex differences. \* =  $p < 0.05$ ; n.s. =  $p > 0.10$ .

Housing standard group		1	2	3
<i>Out-patient consultations:</i>				
Persons with at least one contact	n.s.	80%	79%	79%
Disease episodes per patient <sup>a)</sup>		3.1	2.6	2.8
Contacts per disease episode		1.4	1.3	1.4
Contacts per person <sup>b)</sup>	n.s.	3.5	2.7	3.2
<i>Admissions to hospital:</i>				
Persons with at least one admission	*	18%	19%	27%
Admissions per patient <sup>a)</sup>		1.4	1.2	1.4
Admissions per person <sup>b)</sup>	n.s.	0.3	0.2	0.4

a) calculated per person with at least one contact

b) calculated per person in the entire subgroup

group of medium housing standard was noted (Table 17).

It was presumed that an association existed between lack of tap water in the dwelling and a high incidence of skin infections, but this was not the case. Similarly, an association between the use of coal-fired stove and a high incidence of respiratory infections was presumed to

Table 17. Medical contacts during one year due to certain diseases. Greenlanders from different housing standard groups, Upernavik town 1979–80. Adjusted for age- and sex differences.

\* =  $p < 0.05$ ; (\*) =  $p < 0.10$ ; n.s. =  $p > 0.10$ .

Housing standard group		1	2	3
<i>Skin infections:</i>				
Persons with at least one contact	n.s.	23%	18%	24%
Disease episodes per patient <sup>a)</sup>		1.3	1.2	1.2
Contacts per disease episode		1.6	1.4	2.0
Contacts per person <sup>b)</sup>	*	0.5	0.3	0.6
<i>Respiratory infections:</i>				
Persons with at least one contact	n.s.	29%	29%	30%
Disease episodes per patient <sup>a)</sup>		1.5	1.5	1.5
Contacts per disease episode		1.2	1.3	1.5
Contacts per person <sup>b)</sup>	n.s.	0.5	0.6	0.7
<i>Accidents:</i>				
Persons with at least one contact	(*)	25%	22%	31%
Disease episodes per patient <sup>a)</sup>		1.3	1.3	1.3
Contacts per disease episode		1.2	1.4	1.3
Contacts per person <sup>b)</sup>	n.s.	0.4	0.4	0.5

a) calculated per person with at least one contact

b) calculated per person in the entire subgroup

exist. The incidence of respiratory infections was similar, irrespective of the means of heating, but the contact rate of persons from dwellings with coal-fired stove was 1.4 times higher than that of persons from dwellings with central heating; this difference was most pronounced in children, but not statistically significant.

Households of very high or low housing density were excluded from Tables 18 and 19, which include only households with 6–15 m<sup>2</sup> per person. The smaller the

Table 18. Medical contacts during one year due to all causes. Greenlanders from different sizes of household, Upernavik town 1979–80. Adjusted for age- and sex differences. (\*) =  $p < 0.10$ ; n.s. =  $p > 0.10$ .

Household size		1–5	6–8	9–13
<i>Out-patient consultations:</i>				
Persons with at least one contact	n.s.	79%	79%	76%
Disease episodes per patient <sup>a)</sup>		3.0	2.6	2.8
Contacts per disease episode		1.3	1.4	1.4
Contacts per person <sup>b)</sup>	n.s.	3.3	3.1	3.0
<i>Admissions to hospital:</i>				
Persons with at least one admission	n.s.	24%	20%	17%
Admissions per patient <sup>a)</sup>		1.4	1.4	1.1
Admissions per person <sup>b)</sup>	(*)	0.4	0.3	0.2

a) calculated per person with at least one contact

b) calculated per person in the entire subgroup

Table 19. Medical contacts during one year due to certain diseases. Greenlanders from different sizes of household, Upernavik town 1979–80. Adjusted for age- and sex differences. \*\* =  $p < 0.01$ ; (\*) =  $p < 0.10$ .

Household size		1–5	6–8	9–13
<i>Skin infections:</i>				
Persons with at least one contact	(*)	28%	18%	18%
Disease episodes per patient <sup>a)</sup>		1.1	1.4	1.1
Contacts per disease episode		1.5	1.6	1.6
Contacts per person <sup>b)</sup>	n.s.	0.5	0.4	0.3
<i>Respiratory infections:</i>				
Persons with at least one contact	n.s.	31%	25%	33%
Disease episodes per patient <sup>a)</sup>		1.6	1.5	1.5
Contacts per disease episode		1.4	1.4	1.3
Contacts per person <sup>b)</sup>	n.s.	0.7	0.6	0.6
<i>Accidents:</i>				
Persons with at least one contact	**	22%	30%	15%
Disease episodes per patient <sup>a)</sup>		1.2	1.2	1.8
Contacts per disease episode		1.2	1.2	1.4
Contacts per person <sup>b)</sup>	n.s.	0.3	0.4	0.3

a) calculated per person with at least one contact

b) calculated per person in the entire subgroup

household, the larger the admission rate (Table 18). Incidence and contact rate for skin infections were also highest in the small households (Table 19). A low incidence of accidents in the largest households was balanced by many contacts per patient.

The contact rate for all causes together was similar in all social groups, but the number of disease episodes per patient was highest in the lowest social groups (Table 20). The percentage of persons admitted to hospital was

Table 20. Medical contacts during one year due to all causes. Greenlanders from different social groups, Upernavik town 1979–80. Adjusted for age- and sex differences. n.s. =  $p > 0.10$ .

Social group		I–II	III	IV	V
<i>Out-patient consultations:</i>					
Persons with at least one contact	n.s.	85%	82%	73%	76%
Disease episodes per patient <sup>a)</sup>		2.4	2.6	2.9	3.2
Contacts per disease episode		1.3	1.4	1.4	1.3
Contacts per person <sup>b)</sup>	n.s.	2.8	3.1	3.0	3.1
<i>Admissions to hospital:</i>					
Persons with at least one admission	n.s.	12%	20%	19%	24%
Admissions per patient <sup>a)</sup>		1.0	1.3	1.3	1.5
Admissions per person <sup>b)</sup>	n.s.	0.1	0.3	0.3	0.4

a) calculated per person with at least one contact

b) calculated per person in the entire subgroup

Table 21. Medical contacts during one year due to certain diseases. Greenlanders from different social groups, Upernavik town 1979–80. Adjusted for age- and sex differences. (\*) =  $p < 0.10$ ; n.s. =  $p > 0.10$ .

Social group		I–II	III	IV	V
<i>Skin infections:</i>					
Persons with at least one contact	n.s.	19%	18%	22%	25%
Disease episodes per patient <sup>a)</sup>		1.1	1.2	1.4	1.1
Contacts per disease episode		1.3	1.8	1.2	2.0
Contacts per person <sup>b)</sup>	n.s.	0.3	0.4	0.4	0.6
<i>Respiratory infections:</i>					
Persons with at least one contact	n.s.	30%	27%	29%	27%
Disease episodes per patient <sup>a)</sup>		1.3	1.4	1.6	1.9
Contacts per disease episode		1.1	1.3	1.5	1.5
Contacts per person <sup>b)</sup>	(*)	0.4	0.5	0.7	0.8
<i>Accidents:</i>					
Persons with at least one contact	n.s.	27%	26%	25%	25%
Disease episodes per patient <sup>a)</sup>		1.1	1.2	1.5	1.3
Contacts per disease episode		1.2	1.2	1.4	1.3
Contacts per person <sup>b)</sup>	n.s.	0.4	0.4	0.5	0.4

a) calculated per person with at least one contact

b) calculated per person in the entire subgroup

highest in social group V as was the number of admissions to hospital per patient.

The incidence and contact rate for skin infections was highest in social group V (Table 21). The incidence of respiratory infections was similar in all social groups, but both the number of disease episodes per patient and of contacts per disease episode was highest in the lowest social groups resulting in substantially increased contact rates.

A few additional diseases were studied; the number of contacts due to each of these diseases was, however, so small that any interpretation of the findings must be very cautious. The contact rate for impetigo was low in Danes and high in Greenlanders from small households and from social groups IV and V. Contact rate for chronic purulent otitis media was high in Greenlanders from the poorest housing standard group and from social groups IV and V. Contact rate for gonorrhea was low in Danes and high in Greenlanders from social group V. Contact rate for psychiatric diseases was similar in all socio-economic groups.

## Discussion

The definition of the background population of the present study is considered to be very accurate; Uper-

navik town is so small that it was possible for the investigators to determine the actual composition of the households during the period of study. The official lists of the population had to be corrected in several cases.

The collection of data on housing conditions and social group was done combining official records and interviews. In spite of our competent interpreter the language barrier might have influenced the validity of some of these data in a negative way. Only the present dwelling conditions of the individuals were considered, knowing that the greater part of the population had had their dwelling conditions considerably improved during their life time.

Information on disease episodes was comprehensive and exhaustive. The collection of these data was prospective and was performed in close cooperation between the only two medical officers in the district. Diagnoses must be regarded as fairly accurate; in almost all cases a final diagnosis for registration was not made until the disease was fully developed. A few diagnoses were uncertain as the facilities for paraclinical examinations and specialist aid were limited. It was chosen to study the contact pattern of the population of the town only because the contacts between the medical officers and the population living at the smaller settlements were too irregular to be considered adequate for an epidemiological investigation.

The out-patient clinic was located centrally in the town and anyone not able to walk the few hundred metres would be picked up by the Land Rover of the hospital. It was open night and day all year round, and all medical service was free of charge, so the access to medical care must in principle be regarded as equal to everybody irrespective of age or social status. Nevertheless, a different iatrotropic threshold in different socio-economic groups might exist and represent a serious confounding factor. It was tried to analyze the contact rates for minor diseases, such as common cold, in various socio-economic groups, but the results were inconclusive. On the other hand, in the low housing standard and social groups each disease episode resulted in more admissions to hospital than in the higher socio-economic groups, indicating a higher iatrotropic threshold. This may be explained by the fact that the health service was dominated by Danes and therefore not so readily approached by persons from lower socio-economic groups who most often do not speak Danish and to whom Danish culture is alien.

According to official statistics the average housing standard in Upernavik town is similar to that of Greenland as a whole. Also the age and sex composition of the native population parallels that of the whole of Greenland. Judged by these aspects, therefore, Upernavik town can be regarded as representative of Greenland.

The highest social groups seem to make out an increasing proportion of the native population of Greenland. In 1972-73, 34% of Greenlanders from West Greenland were grouped in "trade economic" group 1

(From et al. 1975); in the present study 50% belonged to social groups I-III which comprise only part of "trade economic" group 1. It is highly possible that this increase has been caused by the fact that more Greenlanders have had an education during the period, thus replacing Danes at higher posts.

The main differences between the contact patterns of Upernavik and Aarhus, Denmark, were summarized in Tables 12 and 13 showing contact rates for specific disorders. These contact rates have not been standardized for age as the age-specific contact rates of these specific disorders in Aarhus were not known. Further, the organization of health service is different in Upernavik and Aarhus and the material of the Aarhus study was collected by many general practitioners, each collecting information on one day's work during normal office hours, whereas that of the Upernavik study was collected by two medical officers during one year both day and night. Finally, the iatrotropic threshold may also be different in the two populations. Thus, the different contact rates in Upernavik and Aarhus cannot be regarded indiscriminately as representing differences in morbidity between the two populations. Nevertheless, the pronounced differences in both standardized and crude contact rates are believed to be an indication of a different pattern of disease in the two populations.

The low occurrence of diabetes and coronary artery disease, as well as the high occurrence of gonorrhea, represent well established knowledge (Sagild et al. 1966a, b, Mikkelsen 1974, Olsen 1976, From 1980).

Epidemic children's diseases were almost absent in Upernavik during the year of study except for a few cases of chickenpox. In Greenland, but not in Denmark, all children are immunized against measles, and the other epidemic children's diseases are introduced to the relatively isolated community of Upernavik only at intervals.

Contact rate for cancer was lower in Upernavik than could be accounted for by the age-composition of the population. Cancer incidence has been found to be significantly lower in Greenlandic males than in Danish, but higher in females resulting in a similar overall incidence (Kromann & Green 1980, Nielsen & Hansen 1982). The Greenlandic cancer pattern is different from the Danish; cancer of nasopharynx, salivary glands, oesophagus, and cervix uteri is much more common in Greenland (Nielsen & Hansen 1982). There were, however, too few cases of cancer in Upernavik to give an impression of the cancer pattern.

There was no difference between Upernavik and Aarhus as regards psychoses, but there were three times fewer contacts due to minor mental disorders in Upernavik. Also contacts due to headache, diseases of climacterium, and sleeplessness, conditions which are strongly influenced by psychic factors, were relatively few in number in Upernavik. The explanation might be that it is not considered worth-while to try to explain your problems to a Danish medical officer who does not

understand your culture or language. Low contact rates due to mental disorders have also been reported from native populations of arctic Canada (Goulston et al. 1980, Ross & Jensen 1980).

The high occurrence of chronic otitis media in various Inuit populations is well known (Lupin 1976). Poor housing conditions have been associated with a high occurrence of otitis (Christensen 1956, Berg & Adler-Nissen 1976). Also in Upernavik the contact rate for chronic otitis media was highest in the lowest housing standard groups (Bjerregaard 1983). This could be the explanation why this disease was more common in Upernavik than in Aarhus.

The very low contact rate for high blood pressure is partly explained by the younger population of Upernavik, but it supports the assumption that this disease is rare in Greenland. However, the rise of blood pressure with age has been found similar in Greenland and Copenhagen (Bjerager et al. 1982), except in polar Inuit (Simper 1976).

Only part of the lower contact rate in Upernavik for urinary infections can be explained by the age-compositions of the populations compared. The low contact rate for atopic diseases of the respiratory tract is probably explained by the dry air with an assumed low content of pollen and other antigens. Impetigo is frequent in persons living under poor housing conditions (Christensen 1956). This might be the explanation why the contact rate for impetigo was higher in Upernavik than in Aarhus. A high contact rate due to all skin diseases was reported from native populations of arctic Canada (Goulston et al. 1980, Ross & Jensen 1980).

Contacts caused by dependency of alcohol were less common in Upernavik than in Aarhus. This may seem astonishing as abuse of alcohol is a great social problem in Greenland. In the first place, however, the anti-alcohol association "Blue Cross" has a strong foothold in Upernavik, and, secondly, only few of the contacts that in one way or the other were caused by abuse of alcohol were grouped as such.

The high contact rate for accidents could be partly explained by the fact that in Upernavik all accidents were included in the study whereas in Aarhus a certain number would be directed to the casualty ward. Death from accidents is, however, much more common in Greenland than in Denmark, according to official statistics. Consumption of alcohol influences the incidence of accidents (Jørgensen et al. 1984), but this association was not studied in the present investigation.

The socio-economic subgroups of the population of Upernavik were small and the number of diseased persons in each group so small that only very marked differences can be expected to be statistically significant at the 5% level. It is therefore considered justified to comment also on trends that were not statistically significant.

Incidences and contact rates for all causes were considerably lower in Danes of Upernavik than in Green-

landers of corresponding social groups. This can, at least partly, be explained by the co-called "healthy worker effect", i.e. the fact that mostly young and healthy Danes live in Greenland, while those chronically ill or unable to work will not move to Greenland.

In the lowest socio-economic groups of Greenlanders there were more admissions to hospital and more contacts due to skin and respiratory infections than in the rest of the population; this pattern was the same whether socio-economic status was measured by housing standard or by social group. There was no indication that incidences or contact rates for skin and respiratory infections were closer associated with the type of water supply or heating installation, respectively, than with either of the socio-economic groupings used. Small households exhibited the contact pattern of low socio-economic groups to a certain degree.

A high rate of admissions to hospital of persons from poor housing conditions was also found by Christensen (1956) and Andersen (1981), but Rantakallio & Väänänen (1976) found no difference in social standing and housing standards between children admitted to hospital and healthy controls.

Regarding the entire population of Upernavik, the rate of admissions to hospital of children from the lowest housing standard group was 2.2 times that of the rest of the children, and that of children from social group V was 1.8 times higher. In Copenhagen, Christensen (1956) found that children from poor housing conditions were admitted to hospital about twice as often as those from good houses. In adults of Upernavik the rate of admissions to hospital of persons from the lowest housing standard group and social group was 1.8 and 1.6 times that of the rest of the adults, respectively. According to Andersen (1981) adults, who had been living under poor housing conditions as children, were admitted to hospital 1.5 times as often as the average. Thus the relative difference between high and low socio-economic groups appears to be of the same order of magnitude in Upernavik as in Denmark.

A significantly increased rate of admissions to hospital for skin infections (impetigo) in children from poor housing conditions was noted by Christensen (1956), whereas Zachau-Christiansen (1972) found fewer skin diseases in children from low social groups. As in the present study, respiratory infections were concurrently reported by Christensen (1956), Zachau-Christiansen (1972), Berg & Adler-Nissen, (1976), and Leeder & Holland (1978) to be more frequent in low socio-economic groups.

The present study has raised a number of questions to be answered by future investigations. Arctic populations are small and data consequently sparse. Accordingly, only marked trends will attain statistical significance. A larger material could be procured either by extending the study over several years or by including other districts of Greenland. Extending the study would introduce an uncertainty of unknown significance as the



Greenlandic community is rapidly changing. Including other districts would introduce problems of standardization and communication between several investigators that would certainly not be minimized by the relative isolation of the towns of Greenland. Nevertheless, the inclusion of several districts should be aimed at in future studies of this kind.

In the present investigation a correlation was demonstrated between the social classification used, housing conditions and certain indicators of health: Low social group was associated with poor housing conditions and a high registered morbidity. This seems to indicate that the social grouping of the Institute for Social Research in Copenhagen is relevant to use also in Greenland; it is recommended that this is done in future socio-medical research to obtain maximum standardization.

It would be of interest to know whether the contact pattern of the Greenlandic population of Upernavik is similar to that of the rest of Greenland, especially whether psychic illness, high blood pressure, and urinary infections are less common in Greenland than in Denmark, and skin infections more common. Once more it has been confirmed that the clinical diagnosis of coronary artery disease is rarely made in Greenland, but the question of the level of atherosclerosis in Greenlanders still awaits a pathological anatomical study.

The most obvious topics of future investigations are whether the established association between socio-economic conditions and disease is similar in the rest of Greenland and to determine what specific constituents of low socio-economic group are responsible for the apparently high morbidity of these groups; eventually the goal must be to try to change these unfavourable conditions of life.

## Appendix

### The PSK classification

PSK 1: Infectious diseases – certain infectious diseases with known microbiological cause, including tuberculosis and venereal diseases. Main exceptions are the majority of respiratory infections, infections of eye and ear, genital infections, urinary infections and skin infections.

PSK 2: Neoplasms – benign tumors, cancer and leukaemia.

PSK 3: Endocrine, nutritional, and metabolic diseases – goiter, diabetes, vitamin deficiency, malnutrition, obesity etc.

PSK 4: Hematological diseases – various types of anaemia and certain other diseases of the blood.

PSK 5: Psychiatric diseases – psychoses, nervous (neurotic) diseases and mental deficiency. Nervous diseases together with some related conditions classed with PSK 16 have been termed minor mental disorders in the present study.

PSK 6: Diseases of the nervous system, eye, and ear – excluding meningitis and cerebrovascular diseases.

PSK 7: Cardiovascular diseases – diseases of the heart and blood vessels, e.g. high blood pressure, coronary artery disease, stroke, phlebitis.

PSK 8: Respiratory diseases – most diseases of nose, throat and lungs, excepting e.g. cancer and tuberculosis.

PSK 9: Gastrointestinal diseases – most diseases of teeth, mouth, salivary glands, stomach, intestinal canal, liver and pancreas, excluding e.g. cancer, mumps, hepatitis and diabetes.

PSK 10: Genitourinary diseases – urinary infections, inflammation of internal female sexual organs, diseases of the breasts, disorders of menstruation and menopause, diseases of male sexual organs etc.

PSK 11: Diseases of pregnancy, delivery, and puerperium – certain diseases of pregnant women, abortion, normal delivery.

PSK 12: Skin diseases – excluding certain infections.

PSK 13: Musculoskeletal and connective tissue diseases – “acute back”, rheumatism etc.

PSK 14: Congenital malformations.

PSK 15: Diseases of the newborn.

PSK 16: Other undesirable conditions – dependency of alcohol and drugs, social and psychic problems.

PSK 17: Accidents – including side effects of medical treatment, suicide, homicide.

PSK 18 (Nordentoft & Reeslev 1979): Other – conditions other than illness or conditions of PSK 16, e.g. contraception, normal pregnancy, examination for V.D.

PSK 99 (Nordentoft & Reeslev 1979): Symptoms that could not be assigned to one of the preceding groups, e.g. fever, headache.

## Acknowledgements

Interpreter Marie Møller and architect Mette Thomasen, Upernavik, were indispensable during the collection of information.

Jørgen Hilden, Dept. of Biostatistics, Institute of Medical Genetics, University of Copenhagen, and Mette Madsen, The Danish Institute for Clinical Epidemiology, Copenhagen, have rendered valuable statistical inspiration and help, but the final responsibility rests with the authors.

Financial support was received from Else and Svend Madsen's foundation and from the Danish Medical Research Council, grant No. 512-20561.

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# Meddelelser om Grønland, Man & Society

## Home Rule in Greenland

Isi Foighel, 1980. Home Rule in Greenland. Meddr Grønland, *Man & Society* 1:, 18 pp, Copenhagen 1980-12-01.

By Danish Act of 29 November, 1978, Home Rule was established in Greenland within the Unity of the Danish Realm. The Act was prepared by a Danish-Greenlandic Commission.

The Act on Home Rule is discussed with special reference to the historical and political background.

By the establishing of Home Rule, powers which hitherto had been vested in the Danish Government and Parliament were transferred to the Greenlandic authorities. The scope of these powers and their legal characteristics are outlined.

Home Rule makes no changes in the international competence or in the relationship between Greenland and the international or interregional organizations. Greenland's membership of the EEC creates some special problems.

The question of ownership of the natural resources was of great importance in the debate in the Home Rule Commission. The Act contains a solution which seeks to give the Danish Government as well as the Greenlanders equal rights in the decision-making procedure, in the administration, and in the sharing of the revenue.

Furthermore, the financing of the Home Rule system, the language problem, the organizing of fishing and trade are being dealt with.

### Man & Society 1 · 1980

Price: Dkr. 35.50  
ISBN 87-17-02855-8

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## The Lipid Metabolism in Greenlanders

Bang, H. O. & Dyerberg, Jørn. 1981. The Lipid Metabolism in Greenlanders. - Meddr Grønland, Man & Soc. 2, 18 pp. Copenhagen 1981.

In the years 1970, 1972 and 1976 the blood lipids in Greenlanders living in the Umanak district and the composition of their food, especially that of their dietary fat were examined in an attempt to explain the rarity of ischaemic heart disease in Greenlanders.

Decreased concentrations of serum cholesterol, triglycerides, low density and very low density lipoproteins and increased concentration of high density lipoprotein in male Eskimos were found. The fatty acid pattern of the serum lipids was different from that of Danes. Especially remarkable was the high concentration of eicosapentaenoic and low concentration of arachidonic acids compared with Danes. The serum lipids of Greenlanders living in Denmark were found similar to that of Danes.

The Eskimo food was found rich in protein and poor in carbohydrate. The fatty acid pattern of the dietary fat was similar to that found in their blood.

We could show - by in-vitro experiments - that eicosapentaenoic acid can act as precursor for thrombocyte active prostaglandins in stead of arachidonic acid in Europeans, giving rise to an anti-aggregatory prostaglandin, probably PGI<sub>3</sub>, but to no pro-aggregatory thromboxane. This causes a shift in the balance towards the anti-aggregatory - and consequently anti-thrombotic - side.

During a fourth expedition in 1978 to the Umanak district our theory from the in-vitro experiments was confirmed by in-vivo observations in the Eskimos. We found decreased platelet aggregability and increased bleeding time.

The rare incidence of ischaemic heart disease and other thrombotic diseases in Greenlanders can be explained by their low serum lipids, their high content of  $\alpha$ -lipoprotein and - probably most important - by their special serum fatty acid pattern giving rise to a decreased platelet aggregability and consequently a decreased tendency to thrombosis.

### Man & Society 2 · 1981

Price: Dkr. 40.50  
ISBN 87-17-02859-0

H. O. Bang & Jørn Dyerberg, Department of Clinical Chemistry, Aalborg Hospital, DK-9100 Aalborg.

## A survey of human exposure to Camp mercury, cadmium and lead in Greenland

Hansen, Jens C. 1981. A survey of human exposure to mercury, cadmium and lead in Greenland. – Meddr Grønland, Man & Soc. 3, 36 pp. Copenhagen 1981–02–27.

Analyses of lead, mercury and cadmium in tissues from seal and fish have shown high concentrations of mercury and cadmium. A toxicological evaluation of the actual concentrations has revealed that in some districts of Greenland, the population may exceed the provisionally tolerable weekly intake (WHO, 1977) of cadmium with from 2 to 20 times and of mercury with from 2 to 40 times. Lead intake was below the provisionally tolerable weekly intake. As these high dietary intakes might have adverse health effects in the consumers, an investigation was undertaken in order to evaluate the human exposure as reflected in blood and hair concentrations. Five districts in Greenland and a control group of Greenlanders living in Denmark have been examined.

A total of 144 persons (including the control group) have participated.

Samples were taken in September and October 1979.

*Mercury.* Strong evidence was found for a connection between mercury exposure and seal-eating. The mercury levels found indicate that the exposure calculated from food analyses is overestimated, but still the most highly exposed groups are on an exposure level where subclinical effects may be anticipated.

*Cadmium.* In general the blood cadmium concentrations are higher in Greenland than in Denmark, but the groups in Greenland were found to be very similar. In hair concentrations no differences between the groups were observed. Separation of data on blood cadmium between smokers and non-smokers showed the differences between the mean values to be highly significant. In spite of the presumably higher dietary intake, no influence on blood concentrations could be observed. Contrary to blood, hair reflected dietary intake but not smoking. The results indicate that neither blood nor hair as only parameter reflects total cadmium exposure.

A positively significant correlation was demonstrated between lead and cadmium concentrations in hair, but not in blood.

*Lead.* Blood concentrations were found to be at the same level as found in Western European countries, but all to be below the limit of 35 µg/100 ml which is the upper individual limit in the EEC-countries.

The highest blood-values were found in the two northern districts, where the level is significantly higher than the level in the two southern districts. The difference was found to be related to varying eating habits, also smoking habits were found to be reflected in blood and hair. Blood was found to be a better index medium than hair for evaluating lead exposure.

*Selenium.* A potentially toxicity-modifying micronutrient selenium was determined in a limited number of hairsamples. No evidence of a high selenium intake could be provided.

Further research is needed especially concerning mercury exposure. Concerning lead and cadmium, the levels found are well below what is regarded a critical level. As, however, the concentrations are on the same level as those found in industrialized countries, follow-up studies seem to be needed in order to observe trends of exposure.

Man & Society 3 · 1981

Price: Dkr. 54.30  
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Jens C. Hansen, Institute of Hygiene, University of Aarhus, Universitetsparken, DK-8000 Århus.

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*Journal*: Macpherson, A. H. 1965. The origin of diversity in mammals of the Canadian arctic tundra. – *System. Zool.* 14: 153–173.

*Book*: Marsden, W. 1964. The lemming year. – Chatto & Windus, London: xxx pp.

*Chapter (part)*: Wolfe, J. A. & Hopkins, D. M. 1967. Climatic changes recorded by Tertiary landfloras in northwestern North America. – In: Hatai, K. (ed.), Tertiary correlations and climatic changes in the Pacific. – 11th Pacific Sci. Congr. Tokyo 1966, Symp.: 67–76.

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**Published by  
The Commission  
for Scientific  
Research  
in Greenland**