

Respiratory symptoms in Greenlanders living in Greenland and Denmark: a population-based study

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Background: Knowledge of respiratory diseases in an arctic population with increasingly westernized lifestyles provides the opportunity to obtain new information in this field.

Objective: To investigate the influence of environment and lifestyle on the presence of respiratory symptoms in a genetically homogenous population sample living under widely differing conditions.

Methods: Greenland is a part of Denmark, but its climate is mainly arctic, as opposed to the temperate climate of southern Denmark. A random sample of Inuits who had immigrated to Denmark and Inuits from 3 towns and 4 remote settlements in Greenland were studied. Of the 6,695 invited Inuits, 4,162 (62%) completed a questionnaire concerning respiratory symptoms and risk factors.

Results: Of the 4,162 Inuits, 847 (20%) had respiratory symptoms. Bronchitis was more frequent in the areas of Greenland than in Denmark (26% and 20% vs 13%; $P < .001$), whereas the pattern of asthma was contradictory (6% and 9% vs 10%; $P = .057$). Bronchitis was associated with living area ($P = .01$), tobacco consumption ($P < .001$), and asthma ($P = .001$), whereas asthma was related to living area ($P = .03$), hay fever ($P < .001$), low intake of whale ($P = .04$), years in Denmark ($P = .09$), and bronchitis ($P < .001$).

Conclusions: Inuits' prevalence of bronchitis and asthma differed, with a higher frequency of bronchitis and a lower frequency of asthma in Inuits living in Greenland compared with Denmark. Living conditions or areas, diet, tobacco use, climate, and atopy are important for the presence of symptoms.

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INTRODUCTION

Respiratory diseases are a worldwide problem and are among the most frequent illnesses in adults.¹ Furthermore, respiratory symptoms seem to be increasing, which emphasizes the importance of knowledge in this area.² Interest has been focused on risk factors and on the socioeconomic burden of respiratory diseases due to health resource use, medication costs, and disability and sick leave benefits.³ Furthermore, the quality of life of persons with respiratory diseases has also been found to be reduced compared with that of healthy persons of the same age,⁴ possibly owing to chronic illness.

Tobacco consumption has profound health effects on adults. Tobacco smoke exposure is an important trigger in the development of respiratory illness⁵; tobacco is the likely

cause of bronchitis in infants⁶ and chronic bronchitis in the elderly.⁷ Although tobacco consumption is of general importance, not everyone who smokes develops respiratory illness, and not all people with symptoms have smoked.

Urban and rural areas have differing prevalences of asthma.⁸ The highest frequency occurs in countries with a western lifestyle,⁴ whereas areas with many parasitic infections have lower asthma rates.⁹ There is some evidence that the prevalence of asthma, and possibly its severity, is increasing in industrialized countries.^{10–12} Furthermore, second-generation immigrants develop asthma as frequently as the people they live among, whereas the asthma prevalence in the first generation is unchanged.¹³ There are, however, still insufficient data to determine the most likely causes of the increase in asthmatic illness. Epidemiologic studies have defined numerous asthma risk factors, eg, atopy, pollution, respiratory infections, other infections (such as tuberculosis or parasites), and other childhood-related factors.¹⁴ Although many factors have been studied, less than 50% of the variation has been explained.¹⁵

The differences in prevalence and incidence of asthma and bronchitis symptoms in different societies emphasizes the need for further research. The fact that people move to other parts of the world may change the expression of diseases in that population. Furthermore, the industrialized way of living, working, and eating might only be found in the new areas,

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which also might contribute to the changing expression of different diseases.

The aim of this study is to describe the prevalence of bronchitis and asthma in genetically homogenous Greenlanders (Inuits) living under different climatic circumstances: one group of Inuits were first-generation immigrants in Denmark, and the other group remained in their area of origin in Greenland. In addition, other potential risk factors were studied: living conditions, education, climate, diet, and tobacco consumption.

MATERIALS AND METHODS

Design

Data were collected between 1997 and 2001 from adult Greenlanders living in Denmark and Greenland. We examined a random sample of first-generation Inuit immigrants living in urban areas of Denmark and a random sample of Inuits from 3 towns on the western coast (Nuuk: $n = 713$; Sisimiut: $n = 435$; and Qasigiannuit: $n = 618$) and from an isolated area of 4 small settlements on the northwestern coast (Uummannaq: $n = 263$). All participants were given a self-administrated general health questionnaire that was initially written in Danish. All questions were translated into Greenlandic and then translated back into Danish to ensure full similarities between the questions in the 2 different languages. In Denmark, all Greenlanders were given the questionnaire in both languages but were told to answer only one of them, whereas in Greenland all questionnaires were in Greenlandic.

Area of Examination

Greenland, a part of Denmark, is an island at the Arctic Circle consisting of 2,175,600 km², of which 85% is ice cap. Approximately 8,000 Greenlanders live in Denmark, and 55,000 live in Greenland. The main city, Nuuk, has a population of 13,500. The towns south of the polar circle can be reached by airplane, whereas towns north of the circle can be reached only by helicopter and boat. Greenlanders are Inuits who are related to the Inuits from Alaska.

Denmark (55°43' N, 12°34' E) is a European country with 5 million inhabitants. The lifestyle is similar to that of other western countries, with indoor pets, office workers, fast food, and tobacco consumption. The climate is temperate, with an annual mean temperature of 8.0° C and a mean temperature in July of 16.5° C.

Nuuk (64°10' N, 51°45' W) is situated approximately 250 km south of the polar circle. The main city, Nuuk, has become the administrative and educational center of Greenland. The Gulf Stream reaches this part of Greenland, preventing the sea from freezing during winter. The climate is arctic, with a mean annual temperature of -1.9° C and a mean temperature in July of 6.5° C.

Sisimiut (66°40' N and 53°50' W) lies just north of the polar circle, making it the most southern town in Greenland with sled dogs. Sisimiut is the second largest town in Greenland,

and it is 1 of 2 rural villages examined in the present study. Nowadays, the main industry is fishery, especially shrimp.

Qasigiannuit (68°40' N and 51°20' W) is reachable only by boat from June to October owing to ice all around the coast, and it is the other rural village examined. This area is rich in birds, seals, and whales, all of which are hunted. The inhabitants work as traditional hunters or fishermen, and some are office workers.

Uummannaq (70°40' N and 52°08' W) is situated approximately 500 km north of the polar circle. The climate is arctic, with a mean annual temperature of -7.4° C and a mean temperature in July of 4.0° C. It consists of a small town reachable only by helicopter and 6 rural remote settlements (villages), a typical dogsled district. The settlements are reachable only by boat from the small rural town. Their inhabitants live mainly as hunters and fishermen, with isolation during the winter, which is from the end of September to June (9–10 months per year).

Materials

A total of 6,695 Greenlanders (ie, 10% of the entire population of Greenland) were invited to participate in the present study. Greenlanders are defined herein as having at least 1 Inuit parent or a Greenlandic ethnic identity.¹⁶ Of the 4,162 participants (62%) who completed the questionnaire, 2,133 (51%) were living in Denmark at the time of enrollment and 2,029 (49%) were living in Greenland. When analyzing those who participated and those who did not, we found no statistically significant difference in mean age ($P < .001$); male participants were significantly underrepresented in Greenland and Denmark.¹⁶

Greenlanders in Denmark. In December 1997, a list of first-generation Inuit immigrants living in Denmark was obtained from the civil registration list. All Inuits living in Denmark aged 18 to 60 years at the time of enrollment were invited to participate. Of 3,513 Inuits, 2,133 (61%) returned a mailed questionnaire during the winter of 1997/1998.

Greenlanders in Greenland. A total of 2,749 Inuits from Greenland were invited to participate in the present study, which took place in Nuuk, Sisimiut, and Uummannaq during the spring and summer of 1999. The study in Qasigiannuit was carried out during the spring of 2000 (for Inuits aged 40–60 years) and 2001 (for Inuits aged 18–40 years). Of 3,182 Inuits invited, 2,029 (64%) participated in the present study of respiratory symptoms in Inuits from Greenland.

Questionnaire Data

Asthma. The frequency of asthma has often been studied in Denmark and other countries.^{15–18} Based on these experiences, a questionnaire that includes the same questions, which are known to be suggestive of asthma or asthmalike symptoms, was used, and the following asthma indicators were investigated:

- Self-reported asthma (an affirmative answer to the question “do you have asthma?”)
- Wheezing

Table 1. Anthropometric Data for the Entire Population

	Denmark (n = 2133)	Nuuk (n = 713)	Sisimiut (n = 435)	Qasigiannnguit (n = 618)	Uummannaq (n = 263)	P value	
						Between groups	Correlation
Age, mean (SEM), y	41.63 (13)	44.07 (13)	45.61 (15)	42.40 (15)	42.60 (15)		
Women, %	71	57	55	53	57	<.001	<.001
Fisherman/hunters, %	0.4	56.8	61.4	60.4	75.0	<.001	<.001
Language used, %							
Greenlandic							
Good/some	74.8	99.4	98.7	100.0	98.0	<.001	<.001
None	25.2	0.6	1.3	0.0	2.0		
Danish							
Good/some	99.6	94.3	89.8	86.4	73.6	<.001	<.001
None	0.4	5.7	10.2	13.6	36.4		
Greenlandic food, %*							
Frequently	4.5	76.0	79.4	84.9	84.1	<.001	
Seldom	77.2	23.5	20.4	14.9	15.9		
Never	18.3	0.4	0.2	0.2	0.0		
Education, %							
Primary school	26.1	37.6	48.0	46.1	50.3	<.001	
Secondary school	20.8	12.0	5.3	2.3	1.4	<.01	
End of education (practice/school)	58.3	64.7	51.7	39.9	15.4	<.001	
Domestic pets, %							
Infancy	53.4	42.1	25.5	35.9	9.3	<.001	<.001
Cats	18.8	2.7	1.2		1.2	<.001	<.001
Indoor dogs	18.0	12.2	0.7		0.6	<.001	<.001
Tobacco consumption							
Ever-smokers, %	82	87	87	88	65	NS	
Current smokers, %	66	71	64	72	49	NS	
Debut age, mean (SEM), y	17.1 (12)	17.7 (12)	17.7 (12)	17.3 (13)	17.8 (14)	NS	
Pack-years, mean (SEM)	12.2 (14)	11.9 (13)	9.1 (11)	11.8 (14)	6.9 (11)	<.001	

Abbreviation: NS, not significant.

* Seal, whale, walrus, polar bear, and arctic birds.

- Use of asthma medication
- Cough on exertion

Furthermore, all participants were asked whether they had symptoms of hay fever (stuffy nose, sneezing, runny nose) or dermatitis ("Do you have eczema?").

Bronchitis. The same questions suggestive of bronchitis that were used in the Copenhagen City Heart Studies¹⁹ were also used in the present study. Study definitions are in accordance with the American Thoracic Society definition of chronic obstructive pulmonary disease (COPD).¹⁷ Questions in the present questionnaire were divided into 3 separate areas concerning respiratory symptoms:

- Daily cough
- Phlegm
- Both present for a 3-month period in 2 consecutive years,²⁰ defining symptoms of bronchitis or COPD-like symptoms

Questions concerning other respiratory symptoms and risk factors for the development of bronchitis and asthma (ie, tobacco consumption, passive tobacco consumption during childhood, pets during childhood, indoor pets at present, and

atopic symptoms other than asthma) were also included. The questionnaire also covered the following areas: alcohol consumption, ethnic background, place of birth, where the individual grew up, number of years living in Denmark, education, present employment, health expectancy, and diet (traditional Greenlandic food; Danish food with vegetables, milk, cheese, and meat; or fast food such as egg rolls, canned food, French fries, and burgers). The frequency of specific food consumption was separated into 6 categories (daily, 1–3 times per week, 4–6 times per week, 2–3 times per month, once a month or less, and never).

Statistics

The data were analyzed using a statistical software package (SPSS; SPSS Inc, Chicago, IL). Logistic regression analysis was used to evaluate commonly accepted bronchitis and asthma risk factors. Nonsignificant variables were deleted by backward elimination. Incidence rates were calculated for the entire group, and differences were tested using χ^2 analysis. Furthermore, differences in mean $\pm$ SD or mean $\pm$ SEM

Table 2. Regression Analysis of Factors with Possible Importance for the Development of Respiratory Symptoms*

	β value	t value	P value
Respiratory symptoms			
Years as smoker	-.178	-4.447	<.001
Symptoms of rhinitis	+.093	2.414	.03
Quality of life	-.079	-2.011	.02
Chronic bronchitis			
Place of living at present	-.086	-2.505	.01
Pack-years	-.124	-3.620	<.001
Ever asthma	+.671	19.588	<.001
Ever asthma			
Rhinitis	.207	4.897	<.001
Place of living at present	.075	2.215	.03
Eating Greenlandic food	.069	2.020	.04
Chronic bronchitis	.564	13.318	<.001
Time in Denmark	-.058	-1.680	.09

* Weighted by age in years.

values between participants with and without respiratory symptoms were tested using parametric analysis (Student t test). $P < .05$ was considered statistically significant.

The Local Ethics Committee of Copenhagen, Denmark, and the Ethics Committee of Greenland approved the present study. All participants received oral and written information and gave informed written consent before enrollment.

RESULTS

We examined 4,162 (62%) of the 6,695 invited Greenlanders. First-generation Inuit immigrants living in an industrialized Scandinavian country, Denmark ($n = 2,133$), composed the first group. The other group consisted of Inuits living under significantly different climatic (temperature, pollution, and allergens) and social (diet, occupation, and infections) conditions in Greenland ($n = 2,029$). Inuits living in Denmark had remained outside their country of origin, Greenland, for a significant period. The mean $\pm$ SEM percentage of years in Denmark, ie, years in Denmark divided by age of the participant, was significantly different in those living in Denmark at the time of enrollment compared with Inuits living in towns or settlements in Greenland ($52\% \pm 0.6\%$, $4\% \pm 0.3\%$, and $2\% \pm 1.1\%$, respectively; $P < .001$). Inuits from towns and settlements had stayed outside Greenland for a similar period ($P = .06$). Significantly fewer fishermen and hunters were found in Denmark vs Greenland (0.4% vs 61% ; $P < .001$)

(Table 1). Furthermore, Greenlanders living in Denmark differed significantly from those living in Greenland with respect to speaking good Greenlandic (62% vs 98%), eating traditional Inuit food (meat from whale, seal, walrus, polar bear and birds) more than 4 to 6 times weekly (5% vs 80%), and at present having domestic cats (19% vs 2%) or indoor dogs (18% vs 7% ; $P < .001$ for all; Table 1).

No significant differences were found between the percentages of ever-smokers (82% vs 84%), current smokers (66% vs 67%), or ex-smokers (16% vs 17%). There were more never-smoking Inuits in Denmark than in Greenland (18% vs 16% ; $P < .03$). The age of smoking debut was similar in both areas (Table 1).

In the present population, 79% had no respiratory symptoms. Of the remaining 21% ($n = 847$), 4.9% had asthmalike symptoms without bronchitis, 2.4% had bronchitislike symptoms but no asthma, and 3.7% had both asthma and bronchitis symptoms. When analyzing factors of possible importance, such as sex, rhinitis, dermatitis, daily intake of traditional Greenlandic food, alcohol consumption, the ability to speak Greenlandic or Danish, years in Denmark, place of birth in Greenland, area of living at ages 5 and 10 years, school education, graduation of education, fisherman, smoking habits, pack-years, years of smoking, debut age of smoking, domestic pets at infancy, domestic pets at the time of enrollment, living area at the time of enrollment, and health expectancy, the presence of respiratory symptoms was found to be associated with reduced health expectancy ($P = .02$), being a smoker ($P < .001$), and having rhinitis ($P = .03$), whereas all other factors were nonsignificant (Table 2). The analysis was weighted by age, because the risk of developing respiratory symptoms increased with increasing age. Significant risk factors for developing chronic bronchitis were living in the northern settlements ($P = .01$), tobacco consumption ($P < .001$), and concurrent asthma ($P < .001$).

Asthmatic patients had frequent stuffy nose ($P < .001$), were living in Denmark at the time of enrollment ($P = .03$), had been living in Denmark longer ($P = .09$), were eating less Greenlandic traditional food ($P = .04$), and had symptoms of bronchitis ($P < .001$). There were no significant associations between the presence of asthma and the other variables listed in Table 2.

Bronchitis was higher in Inuits who lived in Greenland compared with Inuits who had immigrated to Denmark, independent of the high frequency of smokers (65% – 82%) in

Table 3. Respiratory and Atopic Illness in Greenlanders Living in Denmark and in Towns or Rural Villages in Greenland

	Denmark, % (n = 2,133)	Towns in Greenland, % (n = 1,766)	Villages in Greenland, % (n = 263)	P value	
				For χ^2 test	For linearity
Respiratory symptoms	18.6	23.6	25.3	<.001	<.001
Chronic bronchitis	12.7	19.6	25.5	<.001	<.001
Asthma	9.5	8.6	5.5	.10	.057
Hay fever	30.7	27.0	38.0	<.001	.75
Dermatitis	22.7	39.7	24.3	<.001	<.001

both regions ($P < .001$). Asthma was less frequent in Inuits living in the arctic area of Greenland than in first-generation Inuits living in Denmark ($P = .057$). The distribution of hay fever and dermatitis showed no significant trends (Table 3).

DISCUSSION

Greenland is an island at the Arctic Circle comprising 2,175,600 km², of which 85% is ice cap. Greenland is part of Denmark, with 8,000 Greenlanders living in the temperate climate of Denmark and 55,000 Greenlanders living in the arctic climate in Greenland. Inuits in Greenland are genetically related to Inuits from Alaska and Canada. The present study is not only important in Denmark but may also apply to other Inuit immigrant populations and possibly to other immigrant populations with a low incidence of parasitic infestations. As shown in Table 1, 2 groups of Inuits with the same genetic background are being compared: traditional arctic hunters and first-generation Inuits living in the Western culture (more education, office work, fewer ear infections, a higher allergen load, and European food). Inuits from Denmark have lived 52% of their life in Denmark, whereas Inuits from Greenland remained in the arctic region (96%–98% of their life). Furthermore, the participants were first-generation immigrants, indicating that the differences found could not be due to genetic drift or intermarriage with white Danes.

The Greenlandic health and school system is similar to the Danish systems, as most of the physicians, health personnel, and teachers are Danes educated in Denmark. Poverty-related health problems among Greenlandic Inuits are different from those described in Inuits from Alaska and Canada,^{21,22} since health care and schools are free in Denmark. The classification of bronchitis and asthma in the present study is probably similar in Denmark and Greenland. The self-reported respiratory symptom questionnaire was translated into the local dialects. This is a generally accepted tool in population studies.²³

Asthma, bronchitis, and COPD are nonspecific terms that are defined differently by clinicians, pathologists, and epidemiologists, each using different criteria based on symptoms, airflow impairment, and other pathologic abnormalities.²⁴ In epidemiologic asthma studies, “doctor-diagnosed asthma” or “do you have asthma” provides significant and valuable information, usually identifying those who truly have asthma.²⁵ Similar observations have been demonstrated regarding COPD and bronchitis.²⁴ Therefore, the observations of respiratory symptoms in the present study probably have the same significance as earlier findings.^{24,25} Inuits in Denmark and Greenland had more respiratory symptoms than Danes from Denmark.^{3,7} Inuits with respiratory symptoms in the present study showed reduced general physical well-being independent of the area in which they lived. This may reflect reduced life expectancy among Inuits not only because of a dangerous hunting lifestyle, ingestion of mammalian meat contaminated with heavy metals,²⁶ and an increased number of homicides²² but also owing to reduced respiratory health. Tobacco consumption is one of the most important factors associated with reduced health and lung disease.³ An increased frequency of

COPD, chronic bronchitis, and cough and phlegm has been found worldwide owing to tobacco consumption.²⁷ In Denmark, smoking is still accepted in numerous public areas, although less so in recent years. The frequency of smokers in Denmark is similar to that in the rest of Western Europe (30% vs 29% in the European Union),²⁸ whereas the frequency was only 25% in the United States 2 years earlier.²⁹ The high frequency of smokers among Inuits is well known from studies in Denmark in 1996³⁰ and Canada in 1997.³¹ In general, Inuits in the present study had slightly more respiratory symptoms than Scandinavians,^{7,32} which is in accordance with a higher prevalence of smokers (19%–32% vs 65%).²⁸ On the other hand, the frequency of bronchitis among Inuits was slightly lower than expected because of the extremely high number of smokers. The explanation for this remains unclear, and the differences are most interesting to examine in a follow-up design. Furthermore, similar tobacco consumption was found in Inuits living in both Denmark and Greenland, although the frequency of respiratory symptoms was higher in people living in the arctic area compared with Inuits living in the industrialized world. These findings suggest that other important factors in the development of cough and phlegm might be present, such as indoor chimney heating,³³ dry frost at low temperatures, many respiratory infections during childhood, recurrent ear infections frequently found among Inuits, tuberculosis, and others. Furthermore, passive smoke exposure during infancy may provoke respiratory illness during childhood,⁶ which could explain a higher prevalence of respiratory illness later in life, which probably had developed during childhood.^{33,34} The latter could partially explain the present findings, since Inuits in Greenland live very close together, especially during winter. Inuits living in Denmark may have less exposure to passive smoke during infancy, although this is not documented in the present study.

There is worldwide variation in asthma prevalence.¹² It has been postulated that this variation is related to classification difficulties in clinical trials and epidemiologic studies.¹⁰ Furthermore, the reduced ability to contact physicians in the Nordic area of Greenland and, therefore, less “doctor-diagnosed asthma” could explain the reduced number of asthmatic patients in the arctic area. On the other hand, dry cough could be diagnosed as asthma by health personnel, which would incorrectly increase the frequency of asthma. These difficulties are general issues in population studies²³ that also apply to the present study and probably not more in Inuits than found in other studies of Australians and Aborigines.²³ Earlier studies have shown that changes in asthma and allergy frequency occur during the first generation.¹³ Furthermore, Powell et al³⁵ demonstrated in immigrant teenagers that this change was independent of birthplace and age but dependent on the period of living in the new area. These findings are in accordance with the present findings, since Greenlanders who have lived the longest in Denmark were the most likely to develop asthma (Table 2). Development of asthma is different in populations living in urban areas compared with rural areas despite similar genetic backgrounds.⁸ This difference

may be related to the presence of allergens,²³ race, or socioeconomic status¹¹ and to other factors, such as pollution, tobacco, and other airway irritants.¹⁵ We found a low frequency of asthma among Inuits living in the arctic region, who hunt more, speak less Danish, eat more traditional Greenlandic food, have less aeroallergen exposure,³⁶ have fewer domestic pets, and have lower education levels than Inuits from Nuuk and Denmark. Life in Uummannaq is closer to the traditional Inuit life and probably resembles the Alaskan Inuit lifestyle, with less stress and an economic system primarily based on marine mammalian hunting.^{22,35} A change in lifestyle might change disease protection. Such a change may be more devastating for young males, who may lose their hunting identity, start eating fast food, stop exercising, drink more alcohol, and become more violent.^{22,35} Nuuk, the capital city of Greenland, with a westernized lifestyle and a subarctic climate, was shown to have a higher frequency of asthma than Uummannaq. Traditional Greenlandic food from marine mammals (whales, seals, and walrus) and from polar bears and birds might have a high content of different kinds of fatty acids³⁷ and greater parasite content.³⁸ Helmby and Grenis³⁹ demonstrated that infestation with trichina seems to be protective toward developing asthma, whereas other helminthiasis infections were found to induce asthma and atopy,⁴⁰ probably owing to genetic drifting.⁹ These differences might be due to alteration in the T_H2 response, induced by infections, and reduced hygiene in a more crowded environment with fewer domestic pets.⁴¹ First-generation immigrants, in general, seem to adapt slowly to the disease frequency in their new homeland.^{13,35} However, in the present study, first-generation Inuit immigrants altered their asthma frequency toward European findings more rapidly.¹⁵ The reason for this may be related to increased air pollution,⁴² fewer parasites,^{39,43} more *Ascaris lumbricoides* infections owing to crowded western-style kindergartens,⁴⁰ increased aeroallergen exposure,³⁶ a higher frequency of atopy,⁴⁴ and lifestyle changes with more stress and less physical activity. In addition, changes in diet could be a significant factor, with more fast food than in Greenland. However, there is some fast food consumption in Nuuk. Fast food alters the composition of fatty acids into a less attractive combination regarding asthma risk.³⁷ It is uncertain whether the present findings are due to diet, parasitic infections, or a reduced number of allergens in the environment. Future follow-up studies will probably solve this dilemma. Lifestyle changes similar to those observed in Alaska are occurring in northern Greenland, with increasing fast food consumption and use of gasoline-driven snowmobiles replacing the traditional Inuit lifestyle. On the other hand, aeroallergen exposure will presumably remain unchanged except for house dust mites and pets like cats or guinea pigs, which might increase the number of allergens owing to better home insulation.

In conclusion, Greenlanders living in the arctic area had a higher prevalence of bronchitis and less asthma than those living in Denmark. Inuits in Greenland maintained traditional lifestyles, with limited education, a mammalian animal food

diet, hunting, women staying at home, and other aspects of traditional culture and community identity. Furthermore, Greenlanders living in the western world, Denmark, adapt a modern lifestyle within the first generation and probably because of this develop patterns of respiratory illness similar to those of Danes in Denmark.

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