



Child health in Greenland

Author(s): BIRGIT V. L. NICLASSEN and PETER BJERREGAARD

Source: *Scandinavian Journal of Public Health*, 2007, Vol. 35, No. 3 (2007), pp. 313-322

Published by: Sage Publications, Ltd.

Stable URL: <https://www.jstor.org/stable/45149858>

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact support@jstor.org.

Your use of the JSTOR archive indicates your acceptance of the Terms & Conditions of Use, available at <https://about.jstor.org/terms>



JSTOR

Sage Publications, Ltd. is collaborating with JSTOR to digitize, preserve and extend access to *Scandinavian Journal of Public Health*

REVIEW ARTICLE

Child health in Greenland

BIRGIT V. L. NICLASSEN¹ & PETER BJERREGAARD²

¹District Medical Clinic, Nuuk, Greenland, and ²Centre for Health Research in Greenland, National Institute of Public Health, Denmark

Abstract

Aim: To review the knowledge on child health and child health problems in Greenland. **Method:** The review was based on theses, national statistics, national and international reports, and a search in Pub Med, PsycINFO, Web of Science, and WHOLIB databases from 1985 to 2005. The resulting articles were sorted by topic, type, quality of study, and relevance for child health today, providing 47 articles. **Results:** Children in Greenland have become taller and have improved their general health. The morbidity found in Greenlandic children is similar to that found elsewhere even though the magnitude of problems might differ. The child mortality is relatively high and unevenly distributed. The acute disease pattern is dominated by infections, mostly airway infections. Otitis and its sequelae is a problem. An increase in chronic conditions such as atopy, asthma, obesity, and disabilities has taken place. Overweight and obesity have tripled in 20 years and are a health threat as well as constituting negative health behaviour. Social ill health, socioeconomic inequity, and sociocultural changes also influence health but their consequences are not well investigated in children. **Conclusions:** A relatively high child mortality but the same morbidity pattern as in other Western societies was found. Negative health behaviour is frequent in schoolchildren. The influence of rapid cultural changes, and familial and societal factors related to social ill health, together with socioeconomic inequity, are of major importance to the health of children in Greenland. More accurate data on child health are necessary in the future to secure better prioritization. It is suggested to construct a set of reliable indicators of child health in Greenland to monitor the health of children on a national and regional basis.

Key Words: *Adolescents, children, disease pattern, inequity, Inuit, Greenland, social ill-health*

Introduction

In 2003 Home Rule in Greenland initiated work on the first official public health programme. One of the goals of this programme was to define concrete objectives for public health in Greenland from 2006 to 2012. The first result of this initiative was a description of the present status of population health in Greenland [1]. The report focused mainly on the health of adults. The aim of this study is to review the literature on the health and the health problems of children in Greenland today, and thereby turn the focus on child public health in Greenland. Child public health has been defined as: “The organized effort of society to develop healthy public health policies to promote child and young people’s health, to prevent disease in children and young people and

to foster equity for children and young people, within the framework of sustainable development” [2]. In addressing this definition it is obvious that many sectors of society are partners in protecting and promoting the health of children.

Material and methods

Literature on child health in Greenland published from 1985 to 2005 was reviewed. The literature included reviews and books [1,3], theses [4–7], reports from health surveys including children [8–10], official statistics and reports [11–23], the latest medical bibliography [24], searches in PubMed, PsycINFO, Web of Science, and WHOLIB databases, proceedings from the National Health

Correspondence: Birgit Niclasen, District Medical Clinic, PO Box 1001, 3900 Nuuk, Greenland. E-mail: niclasen@greenet.gl

(Accepted 24 August 2006)

ISSN 1403-4948 print/ISSN 1651-1905 online/07/030313-10 © 2007 Taylor & Francis
DOI: 10.1080/14034940600975781

conferences (Nuna Med), and articles found in the reference list of selected articles. In PubMed the search was conducted on "Greenland", with the limits: all child and publication date 1 January 1985 to 1 January 2005. This produced 260 hits. After screening the titles and the abstracts, 138 articles were found. In PsycINFO the search was conducted on "Greenland" and "child*" from 1985. This produced 18 articles. The titles and abstracts were screened. Fifteen articles were found to be irrelevant and two were duplicates, leaving one article. In Web of Science the search was conducted on "Greenland" and "child*" from 1985. This produced 66 hits. The titles and abstracts were screened. Duplicates and irrelevant articles were excluded leaving four articles. Proceedings from the Nuna Med conferences produced eight articles, and six had not been published elsewhere. The WHOLIB database and the Medical Bibliography did not reveal any new articles. One new article was found in the reference lists. The articles were categorized by (a) topic, (b) type and quality of study, and only studies relevant for child health today were selected. Studies of good quality (A studies) were considered to be: reviews, official statistics, randomized controlled trials, major cross-sectional studies, major case-control studies, and major cohort studies. Studies of intermediate quality (B studies) were considered to be: minor

cross-sectional studies, minor case-control studies, and minor cohort studies. All other studies were considered to be C studies. The reason for choosing this method was that some areas were only sparsely investigated, needing the inclusion of studies of lesser scientific quality. The selected studies [25–72] are presented in Table 1.

Determinants of child health in Greenland

Greenland is an Arctic country and a former Danish colony. Greenlandic is the dominant language, but Danish is used in higher education. Greenland has about 56,000 inhabitants of whom 15,000 live in the capital, Nuuk, and the rest in 16 small towns and about 60 villages. The healthcare system is free of charge. The quality of acute services offered locally ranges from a village health worker to the National hospital in Nuuk [66]. Prophylactic consultations are offered to all children before and during school age, and the child-immunization programme includes vaccination against tuberculosis (BCG), whooping cough, diphtheria, tetanus, polio, Haemophilus Influenzae B, mumps, measles, and rubella [13]. The immunization coverage is reported to be between 85% and 95% [53–55]. In 2003, 4.5% of children were born to mothers born outside Greenland, and these are most probably of non-Inuit (Danish) origin [11]. Survey data from 1993–94

Table I. Selected studies on child health in Greenland

Subject	Number of studies	Studies used
Infant and child mortality, lost years of life	14	Aaen-Larsen & Bjerregaard, 2003 [25] (A)
Disease pattern	6	Niclasen, 1998 (A), Becker-Christensen, 1998 (B), Olesen, 1996 (B) [26–28]
Growth	4	Becker-Christensen, 2003 (A), Jacobsen & Moller, 1996 (B) [29–30]
Infections	24	Christiansen et al., 2004 (B), Koch et al., 2003 (A), Thomsen et al., 2003 (B), Langer et al., 1997 (B) [31–34]
Sense organs and oral health	10	Petersen & Christensen, 2004 (A), Homoe et al., 1995 (B), Homoe & Bretlau, 1994 (B) [35–37]
Atopy and related diseases	6	Krause et al., 2002a (A), Krause et al., 2002b (A), Tamsmark et al., 2001 (B) [38–40]
Mental health	7	Lynge et al., 2003 (A), Lynge, 1999 (B), Kabel & Lyberth, 1995 (C), Lynge, 1995 (B) [41–44]
Injuries, violence, and suicide	12	Sundaram et al., 2003 (B), Curtis et al., 2002 (A), Leineweber et al., 2001 (B), Kjær, 1994 (B), Gottlieb & Misfeldt, 1992 (B), Bjerregaard, 1992 (A) [45–50]
Genetic diseases and disability	8	Eiberg et al., 2004 (B), Schwartz et al., 1997 (C) (51–52)
Medicine use and immunization	8	Skifte, 2003 (B), Hansen, 2003 (B), Niclasen, 2000 (C), Niclasen et al., 1995 (A) [53–56]
Health behaviour	10	Schnohr et al., 2003 (B), Poppel and Andersen, 2003 (A) (57–58)
Family health	10	Montgomery-Andersen, 2003 (C), Christensen & Lynge, 2003 (C), Alcon et al., 2002 (B), Alcon & Pedersen, 2001 (B), Curtis et al., 1998 (A), Iburg, 1997 (B), Kreutzmann, 1995 (B) [59–65]
Social health and changes	9	Aaen-Larsen, 2003 (C), Bjerregaard et al., 2002 (A), Bjerregaard, 2001 (A) [66–68]
Contamination and exposure	11	Johansen, 2004 (A), Weihe et al., 2002 (B) [69–70]
Other diseases	11	Schnohr et al., 2005 (A), Blichfeldt, 2003 (B) [71–72]

estimated that 85% of the people living in Greenland were ethnic Greenlanders (Inuit), whereas 4% had a mixed Greenlandic/Danish origin [3].

Some 39% of all households in Greenland include children below 18 years of age. In 2004, 0- to 17-year-olds constituted 30% of the total population and 19.3% of all children lived in a village. In 2002, 76% of all children were living with two adults, and 24% lived in a single-parent family, most often with a woman (19% in all) [12]. The family size was 3.1 persons in the villages versus 2.5 persons in towns [12]. More children lived with only one parent in Nuuk [8]. In 2003, 9% of older schoolchildren lived together with one or more grandparents [10]. The fertility rate has been on the decrease, and in 2003 was 2.35 children/woman during her lifetime [13]. The number of legal abortions nearly equals the number of births [13]. Teenage pregnancies are common, and while 14.8% of all children are born to a teenage mother [13] it has been posited that adolescent pregnancies cause little or no social stigmatization and are not seen as a problem [59]. The maternity leave is 24 weeks, which is shorter than in all other Nordic countries. The school is compulsory for nine years starting at the age of six. The basic school lasts for 11 years, reduced to 10 years in 2009 by the new school law [19]. In 2000–01, 10% of the schoolchildren received special education, and in 16% of these cases social factors caused this need [12]. In total, 19% of children born in 1980 finished school without a final exam, and 38% of those born in 1970 to 1975 did not get any secondary education. Positive predictors for getting an education were parents' education and a well-functioning parental home. In youth growing up with both parents only 35% did not get an education compared with 71% of those raised in a foster home and 82% of those raised in an institution [17]. A negative predictor was to have children early [17].

Some children experience threats to their future health in the parental home [16]. Parental neglect or abuse of children is a frequently debated issue and the media have revealed figures as high as 30% of children suffering from neglect but no systematic investigations have been made. In 2003, the National Association of Municipalities in Greenland stated that 150–200 children needed acute placement outside their home but this could not be confirmed in a report from the Home Rule Government, although it quoted that 30% of mothers themselves had suffered neglect and therefore were at risk of transmitting a negative social inheritance [21]. In 1992, about 3% of all Greenlandic children were placed outside their home by the social authorities with the highest

prevalence in East Greenland (10% of all children) indicating “an alarming dysfunction in the family” [65].

Inequalities in living conditions and health

Within Greenland large differences exist between villages and towns, and between language groups regarding living conditions, education, income, and health. How these differences influence the health of children has not been systematically explored. In 2002, the 10% of households with the lowest income had 0.33% of the total income compared with 35% in the 10% with the highest income. The mean income in the most northern municipality (Qaanaaq) was 52% of the mean income in the capital, Nuuk, in 2003, the dwellings were smaller, and the unemployment rate was higher (6.1% and 11.2% respectively in 2004) [11]. From 1994 to 2002 the self-assessed wealth among 11- to 17-year-olds increased in towns and decreased in villages [8]. In adults, the Greenland Health Interview survey found that more Greenlanders in villages had no secondary education, compared with towns [1,23]. Getting an education also correlates with language, since 64% of those who only spoke Greenlandic did not receive secondary education compared with only 17% of Danish-speaking youth [17]. Greenlanders experienced fatal accidents more often than Danes in Greenland [50]. In East Greenland more police reports on violence, sexual violence, and homicide were made [15] and also suicides and fatal injuries have been seen more frequently here [1,50], but more East Greenlandic children were breastfed for a long time [64]. Fatal injuries were more frequent in villages [50] and adults in villages rated their health worse (RR 1.6), and had functional limitation (RR 1.4) and chronic diseases (RR 1.3) more often compared with those in towns [22]. In smoking, a social gradient developed between the 1993–94 and the 1999 population survey with fewer smokers in higher social groups. Although people in higher social groups consumed more alcohol, binge drinking was more frequent in lower social groups [1]. In more remote areas, a higher infant mortality in general [25] and a lower survival rate of children with a birth-weight under 2000 g have been found [30].

Mortality

In 2003, the mean life expectancy rate in Greenland was 64.1 years in men and 69.5 years in women. This is 10–14 years less than in the other Nordic

countries [13]. In recent years increased wealth, better infrastructure, better care, and better housing have reduced child mortality. New guidelines regarding prenatal care have been introduced and now nearly all births take place at a local hospital or at the national hospital in Nuuk for high risk pregnancies [66]. Despite the efforts, perinatal mortality in 2003 was 12 per 1,000 compared with 6 in Denmark, and infant mortality was 19 in Greenland and 4 in Denmark [13,25]. Among children and adolescents too mortality is relatively high. About 9% of the boys and 4% of the girls can expect to die before the age of 25 years [13]. The most common cause of death in children above one year is accidents, and in youth also suicides and homicide [14,25], all being most frequent in boys. Deaths caused by accidents were related to the traditional lifestyle (drowning, boat accidents, injuries due to fire, cold, firearms, and dog bites) and to traffic accidents [50]. The increase in suicides has been related to the rapid sociocultural changes, to a traditional upbringing in a modern society, to being influenced by aggression and feeling powerless, and also dysfunctional social networks are thought to play a predominant role [14,44,47]. It has been concluded that because of the many unnatural deaths, the increase in tobacco-related deaths, and "a healthcare system without the necessary resources", the increased wealth has not increased the life expectancy in Greenland as expected [13].

Morbidity

During recent years Greenlandic children have become both healthier and taller. In 30 years a 10 cm increase in mean height at age 14 has been observed, and during the past 100 years, the age of menarche has decreased by 3 years to 12.6 years [29]. In 2002, most schoolchildren thought their health was good, but about 25% of 11- to 17-year-old schoolchildren rated their health as "fair" or "poor" [8]. Earlier, the disease pattern was dominated by acute and chronic infectious diseases such as respiratory infections (including otitis media), sexually transmitted diseases, tuberculosis, and hepatitis B infection. Before these "old" diseases had been fully controlled, the rapid changes in society introduced lifestyle diseases such as obesity, hypertension, and non-insulin-dependent diabetes mellitus. These diseases together with alcohol and tobacco-related diseases now dominate the disease pattern in adults [1,3]. The factors contributing most to the changing disease pattern in the Arctic are found to be: The change from an economy based on

hunting to wage earning; improved housing conditions, sanitation and food security; increased contact with the rest of the world; the immigration of non-Inuit (mostly Danish) persons; rapid population growth and increasing concentration of the population, which changed the social structure; dietary changes and an increasingly sedentary lifestyle; and increased access to alcohol and tobacco [3].

There are few recent studies describing the overall disease pattern among Greenlandic children. In 1993, the Greenland Health Interview survey found that 46% of 0- to 12-year-olds had been ill or had had pain during the previous two weeks, and that 9% had been in contact with the healthcare system. These numbers were quite similar to findings among Danish children [22]. In 1991, the disease pattern was dominated by infections (66% of all consultations and 90% in the 0- to 1-year-olds) while a more composite disease pattern was seen among schoolchildren [26]. In 2002 a school survey found symptoms (headache, low back and abdominal pain, and minor mental symptoms) weekly or more often among an average of 48% (39% of boys and 62% of girls) [8], i.e. about the same frequency as found among European children [9]. Two studies concerning the referral pattern to paediatric specialists showed slight differences but the most frequent diagnoses were otitis, epilepsy, asthma, skin diseases, and cerebral palsy [27,28]. Both studies described many health problems influenced by social causes. Foetal alcohol syndrome has not been investigated, but cases have been reported [27].

In 1991, a very high prescription rate to the youngest children, especially of antibiotics, was found [56], but a follow-up in 2001 found the prescription rate of antibiotics to be at the same level as in Denmark (Niclasen, own observation). Some single-gene diseases have been described in Greenlanders [51,52]. The most investigated is Cholestasis Familiaris Greenlandica causing intra-hepatic cholestasis and death in childhood. From 2006 genetic testing is being offered [51].

Acute morbidity

Only respiratory infections have been intensively investigated and found to be common. A cohort study found a high incidence of respiratory infections in children up to two years of age in North Greenland, 1.59 (95% CI 1.46–1.73) episodes of upper respiratory infections, and 0.88 (95% CI 0.78–0.99) episodes of lower respiratory infections per 100 days at risk [7,32]. Meningitis has decreased since the introduction of *Haemophilus Influenzae* vaccination, but the incidence is still high (9/

100,000) (data for all age groups) compared with Denmark (3–4/100,000) [13]. Invasive pneumococcal infection is known to be more frequent in the Arctic and to have a high mortality in adults [31], but this has not been investigated in Greenlandic children.

Chronic morbidity

Chronic infections are rather common. The incidence of tuberculosis in the population is still high (157/100,000 in 2003) [13] and the frequency among youth seems to be increasing as about 25% of all new cases in recent years were found among persons below 20 years of age [3,13]. A case of tuberculosis means substantial consequences for the diseased and a series of healthcare efforts to prevent new cases. The same is the case regarding HIV infection but this has rarely been diagnosed in children and youth in Greenland [13]. The prevalence of chronic Hepatitis B infection is on the decrease, and the planned inclusion of Hepatitis B in the child immunization programme might be reconsidered [13]. Earlier, a high prevalence of serum markers against Hepatitis A was also found in North Greenland [34].

A cross-sectional survey on ear diseases in 3- to 8-year-old children found that 52–54% of children had some kind of pathological affliction in the middle ear. Chronic otitis was found in 9%, middle ear effusion in 23–28%, and tuba dysfunction in 8–13% [4]. A survey of school audiograms found that 11–40% of schoolchildren aged 5–14 had a hearing loss of 20 dB or more at one or more frequencies [36]. Cholesteatomas have been found in 6.6 of 100,000 in children aged 0–14 years, which is comparable to Danish figures [37]. Diabetes type 2 in children has not been scientifically studied. It is still uncommon among Greenlandic children in contrast to findings in other Arctic areas [3] but a few cases have been diagnosed. Earlier, epilepsy was thought to be more prevalent in Greenlandic children but this has recently been disproved [72]. Atopic diseases have been relatively uncommonly diagnosed in Greenland [1], but in 10 years the prevalence of specific IgE antibodies against inhalant allergens in blood doubled from 10% to 19% in 1998 (RR 1.88; 95% CI 1.31–2.68) with the largest increase among the 15- to 19-year-olds [38]. Some 14% of schoolchildren in North Greenland were found to be sensitized to one or more inhalant allergens and 4% to at least one food allergen [39]. The clinical significance of these findings is supported by an almost doubling of the prescriptions of anti-asthmatics to children in Nuuk from 1991 to 2001

(Niclasen, own observation). Skin diseases, especially eczema, are frequent [26,40]. No publications on the frequency of disability among Greenlandic children were found but more children than earlier are being registered as having a handicap and more resources are spent on children with disabilities [18].

Nutrition and oral health

A major future health threat is the increase in overweight and obesity found during recent years. In a 2002 school survey Greenland had the highest proportion of overweight among 15-year-olds (approximately 20%) among 35 countries, and half of 15- to 17-year-old girls considered themselves overweight or were on a diet [8–9]. Among pre-school children aged 6–8 years in Nuuk the prevalence of overweight and obesity has increased to 21.7%, i.e. nearly tripled from 1980 to 2003 [71]. About half of schoolchildren had a daily intake of candy and/or soft drinks, many had a limited intake of fruit and vegetables, and many did not eat breakfast [8–10]. In 2002, 11% of schoolchildren reported going to bed or to school hungry “often” or “always” because of lack of food in their home. This happened for more children aged 11–17 in the villages compared with towns. The most unhealthy eating habits were found in the villages, which also had the highest frequency of obesity (32% compared with 19% in Nuuk) [8]. Oral health in children has been a focus area in Greenland for many years, but the most recent national data showed that dental caries has increased again and less than 20% of Greenlandic six-year-olds were free from caries. Dental caries among children was about five times as frequent as among Danish children [35]. Inherited enzyme deficits such as sucrose malabsorption are common and found in 3–10% of Inuit, and some degree of lactose malabsorption is seen in many children beyond infancy [1]. Food-borne infections including botulism are infrequently reported [13].

Mental health

Major disturbances in eating and dieting (anorexia or bulimia) have not been investigated but are sporadically seen in the surgery. No studies were found on early-acquired mental health problems such as attention deficit hyperactivity disorder (ADHD) and autism but both seem to be on the increase. Only one article was found on child psychiatry [43]. The most frequently reported diagnoses were conduct and attachment disorders (mainly in boys) and sexual abuse (mainly in girls).

In adults, a higher incidence of mental disease and a lower age at first admission to psychiatric ward compared with Denmark were found [6,41]. Risk factors for later personality disturbances or mental illness were failing care, disharmony, and violence in the parental home, often connected to alcohol abuse, and the more recently admitted psychiatric patients reported negative childhood conditions more often than those admitted earlier [41,42,44]. Among adults, serious suicidal thoughts were found more often in the 18- to 24-year-olds and among individuals who had experienced alcohol problems in their parental home [68]. In 2002, 18–36% of Greenlandic schoolchildren reported minor mental health problems such as feeling low, anxiety, or sleeping difficulty, most frequently among the oldest children and among girls [8]. This is about the same frequency as in European countries [9].

Injuries and violence

Injuries are a common cause of contact with the healthcare services and of hospital admission [26,48]. In 1991, injuries made up 10% of all contacts of children with general practice in Nuuk with the highest incidence among schoolchildren [26]. In North Greenland, the incidence of injuries was 25/1,000 children/year and among children below five years of age lack of care often contributed to the injury [48]. A study on sledge dog-bite lesions found that in 87% of the cases the injured was a child below 10 years of age [49]. No research data were available on children's experience of violence but the crime pattern in Greenland is dominated by injuries and the number of reports of violence is almost nine times higher than in Denmark [15]. A survey found that the 18- to 24-year-olds had experienced violence and/or severe threats during the previous year more often than older age groups. In this age group the prevalence of lifetime violence was higher among women than among men [45]. Also sexual abuse was reported most frequently by the 18- to 24-year-olds (25% of women), who also reported the highest prevalence of sexual abuse in childhood (13%) [46].

Health behaviour

School surveys have found that schoolchildren in Greenland have a high frequency of negative health behaviour. About half of 15-year-olds smoked, about 80% had been drunk at least once, many had tried marihuana (about 40% in South and Central Greenland), and more than 75% had had

sexual intercourse. Compared with European schoolchildren these figures are high [9]. The prevalence of sexually transmitted diseases is also high. The incidence of Chlamydia is highest among 14- to 19-year-old girls and the overall incidence was 11 times higher than in Denmark (3,255/100,000) [13]. Risk-taking behaviour seems to cluster as smokers more often had been drunk and had tried marihuana [8]. In comparison with European schoolchildren, Greenlandic schoolchildren are relatively physically active, even if only half reach the recommended level of activity of one hour per day. An increasing number, especially in the towns, spent two hours a day or more looking at television, or using a computer [8]. In 1998, family structure was found to influence health behaviour as more schoolchildren in broken/reconstructed families smoked and drank alcohol. The risk of drinking alcohol was also higher if the child rated communication with his/her parents as being poor [61,62]. Greenlandic speaking youth aged 14–17 years had not been drunk as often and started smoking later, but rated the health risks of smoking and drinking lower than Danish-speaking youth [10].

The environment

Greenland is part of the global society and the concentration of potentially harmful persistent organic pollutants (polychlorinated biphenyls, pesticides, and other compounds) and heavy metals in the marine food chain is a threat to the traditional lifestyle and diet. The dilemma between the positive effects of the traditional diet of marine mammals and fish and pollution is causing concern. In children, these pollutants have potential negative effects on neuro-physiological development, on certain hormones, and on the immune system [1,20,69] but one small survey including 43 children in North Greenland did not show any effects [70]. Further studies are ongoing [1,20]. Also other threats to the traditional culture are seen. Commercialization and globalization of all products including food items are also found in Greenland, which together with the globalization of mass media and information technology are making the experiences of children and young people more universal [9]. The impact of these circumstances on children in Greenland has not been studied.

Discussion

From a child public health point of view it is important to recognize children as a vulnerable

group without the ability to secure their own interests, not only because of their biological immaturity but also because they are children in an adult world and do not have political power. At the same time there is a growing recognition that our basic health, knowledge, attitudes, and habits regarding health are formed during childhood, and early intervention against negative health effects requires rapid recognition [73,74]. The Home Rule Government has through its ratification of the United Nations Convention on the Rights of the Child committed itself to work for children's right to the best achievable health and to work "in the best interests of the child". Child health has without doubt high political priority but the question as to how to spend the limited resources in the best possible way has not yet been answered.

As reviewed, Greenlandic children are physically healthier today than a few decades ago, and most Greenlandic school children are satisfied with their life. Nevertheless, minor mental health problems and psychosomatic symptoms were reported as frequently among schoolchildren in Greenland as in European children and both have been regarded as reactions to stress and as indicators of general ill health [9]. The morbidity of Greenlandic children is similar to that found elsewhere [73] even though the prevalence of the problems may differ. The major epidemics from 50 to 100 years ago have to a large extent been replaced by "common" childhood diseases, mostly respiratory infections that, with the exception of ear diseases, are without major lasting health consequences [26]. Even though these common diseases are more frequent than in other Western countries [7], the recent decrease found in the use of antibiotics in the youngest children indicates that the severity of some infections might have diminished. As indicated in Greenland as well as in all other Western countries, an increase in chronic conditions such as atopy, asthma, obesity, and disabilities has taken place [5,71]. Major mental disease (psychoses) was found to be more frequent and to cause hospitalization earlier in life than in Denmark. These conditions were related to unhealthy and unstable home environments [6]. Apart from the impact of chronic diseases and major disability on daily life and the quality of life, the increase also calls for increased resources for special care, medical treatment, and special education [12,18]. To provide this treatment will be a challenge. The difficult logistics in Greenland already has consequences even for common diseases. Pneumonia in an infant in a village could be life threatening, since the weather may not allow transport for proper treatment.

Another challenge is health behaviour. Greenlandic schoolchildren, as well as adult Greenlanders, seem to have a relaxed attitude to risk-taking behaviour, and more often seem to engage in negative health behaviour regarding oral health, eating, and dieting as well as sexual health, smoking, binge drinking, sniffing, and experimenting with hash. All are areas with consequences for both present and future health [1,8–10].

The family plays an essential role in securing the health of children but some parents in Greenland are not able to fulfil their responsibilities without help. Social health disadvantages seem to be a major threat in Greenlandic children and might to some extent be connected to alcohol abuse. Sexual abuse is a relatively frequent problem with long-lasting health consequences. The many placements of children outside their home and the many children experiencing neglect or abuse indicate that many families in Greenland are suffering. The higher frequency of young adults having experienced alcohol-related problems, violence, and sexual abuse compared with older age groups also indicates that the problem may be on the increase [1]. In other countries approximately 20% of children have special need of help and support to secure their development. No figures are known for Greenlandic children but, considering the problems in families, the frequency is probably higher.

Another threat to health is the substantial socioeconomic differences in Greenland. The differences in living and working conditions, housing standard, and education between different regions, between towns and villages, between social groups, and between language groups in an enormous country with a scattered population and a culture in transition will inevitably be reflected in differences in health. The social extremes in Greenland are a well-educated, bilingual, wage-earning group living in the towns and an uneducated, Greenlandic-speaking group in the villages making their living from small-scale hunting and fishing. One of the factors with the highest known impact on health is poverty, and children are more vulnerable to the effect of socioeconomic conditions than other groups in society [73]. However, no research or reports deal with absolute or relative poverty and its consequences for children. It can be feared that a widening of the inequity gap between the privileged and the less privileged groups of children in Greenland will be seen in the future. The rapid sociocultural changes have contributed to social ill health as well as to other changes in disease pattern [1,3] but the overall effect of the changes in society on health in Greenlandic children has not been

assessed. As Bjerregaard & Young [3] put it: "It is undeniable that physical health has increased in all age groups, but it has probably been at the expense of mental and social health."

Only a minor part of the health threats among Greenlandic children can be handled properly by the healthcare system alone. Health protection and health promotion, especially concerning health behaviour, social ill health, and equity in health must be taken care of by other sectors in society. A first step for securing relevant political priority regarding the health of children in Greenland is the development of relevant monitoring instruments to secure knowledge of the extent of the problems. This could be done by constructing a set of relevant and reliable child health indicators and following these over time. The aim of these indicators would be both to monitor the health of children at the community level and to secure the basis for health-promotion activities. An inspiration for this work might be found in the work on child health indicators initiated by the European Community [74] and the Save the Children foundation in Sweden [75].

References

- [1] Bjerregaard P. Folkesundhed i Grønland [Public Health in Greenland]. Report No. 1-2004. Nuuk: Inussuk; 2004.
- [2] Köhler L. Child public health: A new basis for child health workers. *Eur J Public Health* 1998;8:253-5.
- [3] Bjerregaard P, Young TK. The Circumpolar Inuit – health of a population in transition. Copenhagen: Munksgaard; 1998.
- [4] Homøe P. Otitis media in Greenland: Studies on historical, epidemiological, microbiological, and immunological aspects. Doctoral thesis, University of Copenhagen, 2001.
- [5] Krause TG. Population-based studies on atopy in Greenland. PhD thesis, University of Copenhagen, 2003.
- [6] Lynge I. Psykiske lidelser i det grønlandske samfund [Mental Disease in Greenlandic Society]. Doctoral thesis, University of Copenhagen, 2000.
- [7] Koch A. A longitudinal community based study of respiratory tract infections in Greenlandic children: Disease burden and risk factors. PhD thesis, University of Copenhagen, 1999.
- [8] Schnohr C, Pedersen JM, Alcón MCG, Niclasen B. [Health in Greenlandic Schoolchildren from 1994 to 2002]. Report No. 2-2004. Nuuk: Inussuk; 2005.
- [9] Currie C, Roberts C, Morgan A, Smith R, Settertobulte W, Samtal O, et al. Young people's health in context. Copenhagen: World Health Organization; 2004.
- [10] Statistics Greenland, ESPAD 2003. The European Survey on Alcohol and Other Drugs. Nuuk: Statistics Greenland; 2004.
- [11] Statistics Greenland. The Data Bank. Available at: <http://www.statgreen.gl> (accessed 12 January 2005).
- [12] MIPI, Familiens levevilkår 2004 [Statistics on children and youth in Greenland]. Nuuk: Greenland Homerule; 2004.
- [13] Chief Medical Officer in Greenland, Årsberetning 2003 [Annual Report 2003]. Nuuk: Office of Chief Medical Officer in Greenland; 2004.
- [14] Greenland Homerule, Paarisa, Forslag til National Strategi for Selvmordsforebyggelse i Grønland [Proposing a national strategy for the prevention of suicides in Greenland]. Nuuk: Greenland Homerule; 2004.
- [15] Chief Police Officer in Greenland, Virksomhedsberetning for politiet i Grønland 2003 [Annual Report from the Police in Greenland 2003]. Nuuk: Politiet; 2004.
- [16] Ministry of Family Affairs, Døgninstitutionernes årsberetning [Annual Report from the Social Institutions]. Ministry of Family Affairs. Nuuk: Greenland Homerule; 2004.
- [17] H S Analyse, Hvem får en uddannelse? – En undersøgelse, af de forhold der er bestemmende for unges påbegyndelse og fuldførelse af en uddannelse [Who is getting an education?]. Ministry of Culture, Education, Research and the Church. Nuuk: Greenland Homerule; 2001.
- [18] Ministry of Finances, Finansloven 2005 [Finance Act 2005]. Nuuk: Greenland Homerule; 2004.
- [19] Ministry of Education, Folkeskolen 2003/2004 [Primary School 2003/2004]. Nuuk: Greenland Homerule; 2004.
- [20] AMAP, AMAP assessment 2002: Human health in the Arctic. Oslo: Arctic Monitoring and Assessment Programme; 2003.
- [21] Ministry of Family Affairs, Rådgivende Udvalg for afhjælpning af omsorgssvigtende børn og unge [Advisory Committee on the Protection of Children]. Nuuk: Greenland Homerule; 2003.
- [22] Curtis T, Iburg KM, Bjerregaard P. Familie, børn og sundhed i Grønland [Family, Children and Health in Greenland]. Copenhagen: National Institute of Public Health; 1997.
- [23] Bjerregaard P, Curtis T, Senderowitz F, Christensen U. Levevilkår, livsstil og helbred i Grønland [Conditions of life, lifestyle and health in Greenland]. Copenhagen: National Institute of Public Health; 1995.
- [24] Christensen U, Bjerregaard P. Greenland Medical Bibliography 1970-1995. Copenhagen: National Institute of Public Health; 1998.
- [25] Aaen-Larsen B, Bjerregaard P. Changes in causes of death and mortality rates among children in Greenland from 1987-91 to 1992-99. *Scand J Public Health* 2003;31: 187-93.
- [26] Niclasen BV. Disease pattern in children living in the Arctic: Visits to a general practitioner by 0- to 14-year-old children living in Nuuk, Greenland. *Int J Circumpolar Health* 1998;57(Suppl. 1):141-7.
- [27] Becker-Christensen FG. [Diseases and health problems among children in Greenland: An epidemiological study based on referrals to special pediatric care in eight different districts of Greenland 1992-94]. *Ugeskr Laeger* 1998; 160:2856-62.
- [28] Olesen T. [Profile of pediatric diseases and symptoms in Southern Greenland: Experiences of a consultant visiting in 1992]. *Ugeskr Laeger* 1996;158:52-4.
- [29] Becker-Christensen FG. Growth in Greenland: Development of body proportions and menarcheal age in Greenlandic children. *Int J Circumpolar Health* 2003;62:284-95.
- [30] Jacobsen T, Møller SM. Prematurity in Greenland: A study of infants with a birthweight below 2000 g. *Acta Paediatr* 1996;85:100-3.
- [31] Christiansen J, Poulsen P, Ladefoged K. Invasive pneumococcal disease in Greenland. *Scand J Infect Dis* 2004;36: 325-9.
- [32] Koch A, Molbak K, Homøe P, Sørensen P, Hjuler T, Olesen ME, et al. Risk factors for acute respiratory tract infections in young Greenlandic children. *Am J Epidemiol* 2003;158:374-84.

- [33] Thomsen VØ, Lillebaek T, Stenz F. Tuberculosis in Greenland: Current situation and future challenges. *Int J Circumpolar Health* 2004;63(Suppl. 2):225-9.
- [34] Langer BC, Frosner GG, von Brunn A. Epidemiological study of viral hepatitis types A, B, C, D and E among Inuits in West Greenland. *J Viral Hepatitis* 1997;4:339-49.
- [35] Petersen PE, Christensen LB. [The Development in oral health in children, youth and adults in Greenland. *Tandlægernes Nye Tidsskrift* 2004;19:9-19.
- [36] Homoe P, Christensen RB, Breatlau P. Hearing in elementary school children in Nuuk and Sisimiut, Greenland. *Arctic Med Res* 1995;54:145-50.
- [37] Homoe P, Bretlau P. Cholesteatomas in Greenlandic Inuit: A retrospective study and follow-up of treated cases from 1976-91. *Arctic Med Res* 1994;53:86-90.
- [38] Krause T, Koch A, Friberg J, Poulsen LK, Kristensen B, Melbye M. Frequency of atopy in the Arctic in 1987 and 1998. *Lancet* 2002;360:691-2.
- [39] Krause TG, Koch A, Poulsen LK, Kristensen B, Olsen OR, Melbye M. Atopic sensitization among children in an arctic environment. *Clin Exp Allergy* 2002;32:367-72.
- [40] Tamsmark TH, Koch A, Melbye M, Molbak K. Incidence and predictors of atopic dermatitis in an open birth cohort in Sisimiut, Greenland. *Acta Paediatr* 2001;90:982-8.
- [41] Lyng I, Munk-Jørgensen P, Pedersen AL, Mulvad G, Bjerregaard P. Common mental disorders among patients in primary health care in Greenland. *Int J Circumpolar Health* 2004;63(Suppl. 2):377-83.
- [42] Lyng I, Mortensen PB, Munk-Jørgensen P. Mental disorders in the Greenlandic population: A register study. *Int J Circumpolar Health* 1999;58:188-97.
- [43] Kabel M, Lyberth N. Experiences from a consultative journey to Greenland presented by a child psychiatrist and a psychologist. *Arctic Med Res* 1995;54(Suppl. 1):74-6.
- [44] Lyng I. Mental disorders and conditions of life in childhood in Greenlanders. *Arctic Med Res* 1995;54(Suppl. 1):60-7.
- [45] Sundaram V, Curtis T, Helweg-Larsen K, Bjerregaard P. Can we compare violence data across countries? *Int J Circumpolar Health* 2004;63(Suppl. 2):389-96.
- [46] Curtis T, Larsen FB, Helweg-Larsen K, Bjerregaard P. Violence, sexual abuse and health in Greenland. *Int J Circumpolar Health* 2002;61:110-22.
- [47] Leineweber M, Bjerregaard P, Baerveldt C, Voestermans P. Suicide in a society in transition. *Int J Circumpolar Health* 2001;60:280-7.
- [48] Kjær NK. [A prospective registration of child accidents in Ilulissat, Grønland, 1992]. In: Kern P, editor. *Nuna Med* 1994. Nuuk: Nuna Med; 1994. p 39-43.
- [49] Gottlieb JO, Misfeldt JC. [Dog bites in the sledge-dog districts of Greenland]. *Ugeskr Laeger* 1992;154:2824-7.
- [50] Bjerregaard P. Fatal non-intentional injuries in Greenland. *Arctic Med Res* 1992;51(Suppl. 7):22-6.
- [51] Nielsen IM, Eiberg H. Cholestasis Familiaris Groenlandica: An epidemiological, clinical and genetic study. *Int J Circumpolar Health* 2004;63(Suppl. 2):192-4.
- [52] Schwartz M, Blichfeldt S, Muller J. X-linked adrenal hypoplasia in a large Greenlandic family: Detection of a missense mutation (N4401) in the DAX-1 gene; implication for genetic counselling and carrier diagnosis. *Hum Genet* 1997;99:83-7.
- [53] Skifte TB. Childcare immunization programme: To what extent are children covered by vaccinations in Greenland? *Int J Circumpolar Health* 2004;63(Suppl. 2):252-5.
- [54] Hansen CH, Koch A, Wohlfahrt J, Melbye M. A population-based register study of vaccine coverage among children in Greenland. *Vaccine* 2003;21:1704-9.
- [55] Niclasen B. Brug af profylaktiske børneundersøgelser og vaccinationsdækningen i Nuuk i 1998 og 1999 [The use of prophylactic health examinations for children and vaccine coverage in Nuuk 1998 and 1999]. *Nuna Med* 2000. Nuuk: Nuna Med; 2000. p 70-2.
- [56] Niclasen BV, Møller SM, Christensen RB. Drug prescription to children living in the Arctic: An investigation from Nuuk, Greenland. *Arctic Med Res* 1995;54(Suppl. 1):95-100.
- [57] Schnohr C, Pedersen JM, Alcón M, Curtis T, Bjerregaard P. Trends in the dietary patterns and prevalence of obesity among Greenlandic school children. *Int J Circumpolar Health* 2004;63(Suppl. 2):261-4.
- [58] Poppel B, Andersen T. Alcohol and other drug use among students in Greenland: A comparison between some 1999 and 2003 ESPAD data. *Int J Circumpolar Health* 2004;63(Suppl. 2):410-3.
- [59] Montgomery-Andersen R. Adolescent mothers: A challenge for First Nations. *Int J Circumpolar Health* 2004;63(Suppl. 2):274-9.
- [60] Christensen E, Lyng I. The importance of family to health, development and welfare of children. *Int J Circumpolar Health* 2004;63(Suppl. 2):248-51.
- [61] Alcon MCG, Pedersen JM, Maria A, Gonzalez C. Greenlandic family structure and communication with parents: Influence on schoolchildren's drinking behaviour. *Int J Circumpolar Health* 2002;61:319-31.
- [62] Alcon MCG, Pedersen JM. Family as a child development context and smoking behaviour among schoolchildren in Greenland. *Int J Circumpolar Health* 2001;60:52-63.
- [63] Curtis T, Thomsen K, Bjerregaard P. Family pattern and family care in Greenland. *Int J Circumpolar Health* 1998;57(Suppl. 1):109-12.
- [64] Iburg KM. Udviklingen i amningsmønsteret i Grønland [Changes in breastfeeding in Greenland]. *Nuna Med* '97. Nuuk: Nuna Med; 1998. p 134-7.
- [65] Kreutzmann G. A one year Greenlandic study of temporary and permanent placement of children and adolescents outside their homes. *Arctic Med Res* 1995;54(Suppl. 1):68-73.
- [66] Aaen-Larsen B. Health care in the circumpolar world: Greenland. *Int J Circumpolar Health* 2004;63(Suppl. 2):49-53.
- [67] Bjerregaard P, Curtis T, Greenland Population Study, Cultural change and mental health in Greenland: The association of childhood conditions, language, and urbanization with mental health and suicidal thoughts among the Inuit of Greenland. *Soc Sci Med* 2002 Jan;54:33-48.
- [68] Bjerregaard P. Rapid socio-cultural change and health in the Arctic. *Int J Circumpolar Health* 2001;60:102-11.
- [69] Johansen P, Muir D, Asmund G, Riget F. Human exposure to contaminants in the traditional Greenland diet. *Sci Total Environ* 2004;331:189-206.
- [70] Weihe P, Hansen JC, Murata K, Debes F, Jørgensen P, Steuerwald U, et al. Neurobehavioral performance of Inuit children with increased prenatal exposure to methylmercury. *Int J Circumpolar Health* 2002;61:41-9.

- [71] Schnohr C, Sørensen TIA, Niclasen B. Changes since 1980 in body mass index and the prevalence of overweight among inschooling children in Nuuk, Greenland. *Int J Circumpolar Health* 2005;64:157–62.
- [72] Blichfeldt S, Bille T, Nielsen I-M, Nielsen SM. Epilepsy among children in Greenland. *Int J Circumpolar Health* 2004;63(Suppl. 2):363–5.
- [73] Köhler L. Indikatorer för barns hälsa i Sverige [Indicators for the health of children in Sweden]. Stockholm: Redda Barnen; 2004.
- [74] Briggs D. Making a difference: Indicators to improve children's environmental health. Geneva: World Health Organization; 2003.
- [75] Blair M, Stewart-Brown S, T W, R C. Child public health. Oxford: Oxford University Press; 2003.
- [76] Rigby M, LK, editor. Child Health Indicators of Life and Development (CHILD): Report to the European Commission. Keele: Center for Health Planning and Management for European Commission Health and Consumer Protection Directorate; 2002.