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## Article

# Measuring social inequality in health amongst indigenous peoples in the Arctic. A comparison of different indicators of social disparity among the Inuit in Greenland

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## ABSTRACT

The purpose of the article is to compare different indicators of social position as measures of social inequality in health in a population sample from an indigenous arctic people, the Inuit in Greenland. Data was collected during 2005–2015 and consisted of information from 3967 adult Inuit from towns and villages in all parts of Greenland. Social inequalities for smoking and central obesity were analysed in relation to seven indicators of social disparity in four dimensions, i.e. education and employment, economic status, sociocultural position, and place of residence. For each indicator we calculated age-adjusted prevalence by social group, rate ratio and the concentration index. The indicators were correlated with Pearson's  $r$  ranging from 0.24 to 0.82. Concentration indices ranged from 0.01 to 0.17. We could not conclude that one indicator was superior to others. Most of the indicators were traditional socioeconomic indicators used extensively in research in western countries and these seemed to be useful among the Inuit too, in particular household assets and job. Two sociocultural indicators developed for use among the Inuit and which included parameters specific to the indigenous peoples in the transition from a traditional to a modern life style proved to be equally useful but not superior to the traditional socioeconomic indicators. The choice of indicator must depend on what it is realistic to collect in the actual research setting and the use of more than one indicator is recommended. It is suggested to further develop culture specific indicators of social position for indigenous peoples.

## 1. Introduction

Social factors influence health and the measurement of social position is an important tool in epidemiological research and more generally in health research and practice. Social position may be measured in a variety of ways, by single items and composite scores. It is poorly analysed to what extent the social position indicators of western societies, such as education and income, are sufficiently informative among indigenous peoples in an historical transition from a traditional hunting or agrarian society to a modern post-industrial society. It may well be the case that being a skilled hunter or an accomplished story teller or having extensive kinship ties is as important for one's position in the social hierarchy as formal western style education or monetary income. The choice of measure for social inequality depends on the investigators' perspective on social inequality in health (Mackenbach & Kunst, 1997; Harper et al., 2008). Several indicators are needed to

provide a clear picture of health disparity and its change over time (Harper et al., 2008).

Recently, an increased focus has been put on indigenous and tribal peoples' health by major journals. A review of the determinants of indigenous health indicated that the transition from traditional to modern lifestyles included increasing prevalence of mental disorders, alcohol problems, obesity, and type 2 diabetes (Gracey & King, 2009). The underlying causes of health disparities between indigenous and non-indigenous people were discussed by King, Smith, and Gracey (2009) who provided an indigenous perspective to understanding these inequalities. Furthermore, a global collaborative study systematically collated data across a broader sample of countries and indicators including Greenland and recommended improved access to indigenous data within national surveillance systems (Anderson et al., 2016). Most studies of social inequality involving indigenous peoples are, however, comparisons of indigenous and non-indigenous (synonyms: western,

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white, majority) population groups within the same country. Greenland is a strong case to go beyond this and study social inequality within an indigenous people because the Inuit make up a majority in Greenland (90%) and because Greenland has its own government, own statistical bureau and own population health surveys. Data on social position and health from the Inuit in Greenland is detailed and plentiful and although each indigenous people is unique the findings from Greenland are not only relevant for the Inuit in Greenland, Canada and Alaska but also for other indigenous peoples in the Arctic and indeed for indigenous peoples globally.

Several traditional western indicators of social position have been used in epidemiological studies from Inuit populations in Greenland and Canada. These include education (Bjerregaard, 2010; Bjerregaard & Jørgensen, 2013; Riva, Larsen, & Bjerregaard, 2016; Zienczuk & Egeland, 2012), housing conditions (Egeland, Faraj, & Osborne, 2010; Riva, Larsen, & Bjerregaard, 2014a; Riva et al., 2014b; Ruiz-Castell et al., 2015), job and income (Bjerregaard & Jeppesen, 2010; Bjerregaard & Jørgensen, 2013; Zienczuk & Egeland, 2012). Studies from Alaska have taken a broader view and have included addiction; social isolation; environmental exposures; diet, nutrition and exercise; access to quality health care; access to clean water; global climate change; sexual and reproductive health; and occupational health and safety as social determinants of health (Driscoll, Dotterer, & Brown, 2013).

In order to extract information about social position that is more specific to indigenous communities undergoing a rapid cultural and economic transition, a number of additional indicators of social position have been used in Greenland. These include current place of residence (Bjerregaard & Curtis, 2002; Bjerregaard & Jeppesen, 2010; Bjerregaard & Larsen, 2015; Jørgensen, Moustgaard, Bjerregaard, & Borch-Johnsen, 2006; Jørgensen, Borch-Johnsen, Witte, & Bjerregaard, 2012), language skills (Bjerregaard & Curtis, 2002; Jørgensen et al., 2006), and composite sociocultural variables that reflect participation in the transition from a traditional hunting life to a western urban life (Bjerregaard, Larsen, Dahl-Petersen, & Buchardt, 2017; Bjerregaard & Dahl-Petersen, 2011; Larsen, Curtis, & Bjerregaard, 2013). In northern Scandinavia, reindeer herders have been shown to have lower Sense of Coherence (Abrahamsson, Lindmark, & Gerdner, 2013) and higher mortality from injuries other than suicides (Hassler, Sjölander, Johansson, Grönberg, & Damber, 2004) than other Sami from the same area.

The purpose of the present study was to analyse strengths and weaknesses of different indicators of social position as measures of health disparities among the Inuit in Greenland. Social inequalities for smoking and central obesity were analysed in relation to seven indicators of social disparity in four dimensions, i.e. education and employment, economic status, sociocultural position, and place of residence.

## 2. Methods

The total population of Greenland is 57,000 of whom 90% are ethnic Greenlanders (Kalaallit, Inuit). Genetically, Greenlanders are Inuit (Eskimos) with a 25% admixture of European, mainly Scandinavian genes (Molte et al., 2015). The Greenlanders are closely related genetically and culturally to the Inuit/Inupiat in Canada and Alaska and, somewhat more distantly, to the Yupit of Alaska and Siberia (Damas, 1984).

### 2.1. Data collection

Data was collected in 2005–2010 and 2014–2015 as part of two countrywide cross-sectional health surveys in Greenland (Fig. 1). The health surveys were mandated by the Department of Health in Greenland with the specific aim to support the Public Health Programme. There was an overlap between participants in the two surveys and for



Fig. 1. Map of Greenland with sampling communities.

1255 persons who participated in both studies only information from the most recent survey was included (see supplementary material). The study methods were identical and a full description of the study methods is available elsewhere (Bjerregaard, 2011; Dahl-Petersen, Olesen, & Bjerregaard, 2016). In brief, the participants, aged 18 years and older, were selected through a stratified random sample of adults in Greenland, who had been born in Greenland or Denmark. The sample was a random sample of individuals and if someone refused to participate no one for the same household was included. Only participants defined at enrolment as Inuit based on their primary language and self-identification were included in the present study. Data was collected by interview and clinical examination in 11 towns and 16 villages. A town is defined historically as the largest community in each of 17 districts. In 2010, the population of the towns varied between 469 and 5460 with a further 15,469 residents in Nuuk, the capital. Population in villages varied from less than 10 to around 550. The participation rate was 67% (in 2005–2010) and 63% (in 2014–2015). Questionnaires were developed in the Danish language, translated into Greenlandic, back translated and revised. Interviews and self-administered questionnaires gave information about socio-demographic factors, self-rated health and disease, and lifestyle including diet, physical activity, smoking and alcohol use. Interviews were conducted in the language of choice of the participant, most often in Greenlandic, by native Greenlandic speaking interviewers who had been trained for 1–2 days on the job in the study procedures. A Greenlandic university trained midwife with more than 10 years' experience with interview based data collection in Greenland was responsible for collecting the data, training the interviewers and recruiting the participants. She was supervised on an almost daily basis by the PI who is a physician. A total of 3967 Inuit participated in the two surveys.

### 2.2. Indicators of social position

Demographic and social variables were obtained from the interview and in the case of income from Statistics Greenland (2005–2010 data only). When possible, categories were combined in order to include at least 10% of the participants in each category. The variables were

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