

Greenlandic schoolchildren's compliance with national dietary guidelines

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Abstract

Objective: The aim of the present study was to examine to what extent children and adolescents in Greenland comply with the national dietary guidelines, and to analyse the influence of habitation and family affluence on the compliance with dietary guidelines.

Design: Data were from the Health Behaviour in School-aged Children (HBSC) survey in Greenland. The 2006 survey included 2462 students aged 11 to 17 years.

Results: The proportion of students complying with the national dietary guidelines varied from 14% to 87% depending on the food item. Sweets and soft drinks had the lowest compliance. The oldest children had the following characteristics compared with the younger children: fewer ate traditional Greenlandic foods, fewer ate fruit, fewer ate breakfast daily on school days and more drank soft drinks frequently. More boys than girls ate traditional Greenlandic foods often, while more girls ate vegetables daily. The least favourable eating habits in general were found among children from low affluent families and children in villages.

Conclusions: Many Greenlandic schoolchildren did not comply with the national dietary guidelines. Despite a higher intake of traditional foods as a whole, children in villages and less affluent children were less likely to comply with guidelines. A strong relationship between diet, family affluence and availability was found. The study findings indicate that factors such as availability, cost and seasonal variation are important to the intake of both imported and traditional Greenlandic foods. The findings should be taken into consideration when promoting the national guidelines.

Keywords
Schoolchildren
Diet
Compliance
Guidelines

Most countries have policies on nutrition and food safety, and general recommendations to the public on a healthy diet. Despite these public guidelines the burden of disease associated with poor nutrition continues to grow worldwide⁽¹⁾, and Greenland is no exception.

Greenland is located in the Arctic region. It is the largest island in the world. People live on the coastline only because the large central icecap covers most of the island. The population is 57 000 inhabitants of whom 30% are children below 18 years of age. About 90% of the population is of Inuit origin. The Inuit in Greenland have a distinct culture, and language and diet are unique and central markers of Greenlandic culture⁽²⁾. Greenland has seventeen small cities and sixty villages scattered along the coastline. The habitations are connected by boat or plane only. A more traditional lifestyle and getting a living from small-scale fishing and hunting are generally seen in the villages.

The economic conditions in villages are generally more unfavourable than those found in nearby towns.

Diseases related to diet and other lifestyle conditions such as overweight and diabetes are among the fastest growing diseases in the Arctic⁽²⁾. The epidemic of obesity has also reached Greenland^(3–5) and type 2 diabetes is beginning to show in the child population. During the past 25 years, overweight in children has increased threefold. Today, nearly 25% of schoolchildren in the first grade have been found overweight or obese. In addition, the age when reaching overweight has continued to decrease, and early acquired overweight has been found to track into adolescence in a majority of children^(3–5).

Diet in the Greenlandic context

The traditional Greenlandic diet is based primarily on meat and blubber from marine mammals, providing a diet rich in protein and fat including only a small amount of carbohydrate. The local foods play an important role

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socially and culturally, and are regarded as being healthier than imported foods.

Globalization of the human diet is an area of growing importance, not least in Greenland. As a country in societal transition, rapid changes in dietary habits and a process of a fast 'nutritional transition' have been seen⁽⁶⁾. This development has led away from a high intake of traditional and locally derived foods towards a more Westernized diet, with increased use of imported food items. Imported foods provide approximately 75% of the energy consumed⁽⁷⁾, but local variation exists. Today, the recommended energy distribution from macronutrients is the same as in other Nordic countries (55–60% from carbohydrates, 10–15% from protein, no more than 30% from fat)⁽⁸⁾. Among adults, the energy distribution is close to the recommendation including approximately 20% from protein and 33% from fats⁽⁸⁾. The energy distribution in Greenlandic children has not been investigated. Still one result of the rapid dietary transition is large differences in food choices between young and old as the use of traditional and local foods has decreased, especially in young adults^(9,10).

Access to imported foods, especially fresh fruit and vegetables, is highest and prices lowest in the capital and the larger cities. The traditional and local foods are often self-supplied and self-supply of local foods is more common in the villages and more remote areas^(9,10). Some berries grow along most of the coastline, while potatoes and a few vegetables are grown in southern Greenland.

In 2006, the Greenlandic Board of Nutrition launched nine general dietary recommendations to the public. In general, these are very similar to recommendations in other Nordic and European countries and those of WHO⁽¹⁾, with the exception that the Greenlandic advice includes intake of traditional local foods. These are fish and meat from seal, whale, polar bear, musk ox, birds, reindeer and lamb. Lamb is herded only in southern Greenland. These unique recommendations are balancing the dilemma between the positive health effects of the traditional diet of especially marine mammals, and the pollution of these items by the concentration of potentially harmful persistent organic pollutants (primarily polychlorinated biphenyls), pesticides and heavy metals in the marine food chain. This pollution is a threat to the traditional lifestyle and diet. In children, these pollutants have potential negative effects on neurophysiological development, certain hormones and the immune system^(11,12). Nutrition is included as a focus area in the present public health programme in Greenland⁽¹³⁾.

A healthy diet is not only a choice between imported and local foods, it depends strongly on the composition of the mixed diet⁽⁶⁾ and the quality of both imported and local foods. Future strategies regarding dietary recommendations to the young Greenlandic population must build on the success of the present strategy.

The aim of the current study was to examine to what extent children and adolescents in Greenland comply

with the current dietary guidelines, and to analyse the influence of habitation and family affluence on the compliance with dietary guidelines.

Material and methods

National guidelines and derived objectives

It was possible to secure data to an operationalization of eight of the ten national dietary guidelines (Table 1). The most important dietary items without data were brown bread (which was excluded) and home-made meals (instead frequently eating precooked dinners was measured).

1. *Vary your diet*. To vary the diet is considered the most important of all the recommendations due to the potential negative health effects of a high intake of pollutants through dietary intake of marine mammals, polar bear (caught only in north and east Greenland), and to some extent wild birds, due to the lead content. Special guidelines on the intake of traditional foods exist with regard to children. In the current study, variation was defined as less than four meals per week including seal meat, or four including wild fowl, or four including whale meat.
2. *Eat Greenlandic foods, eat fish often* was divided into three objectives: (i) eating marine mammals (seal or whale) between one and three times weekly; (ii) eating local terrestrial animals (reindeer, musk ox or lamb) at least once weekly or birds between one and three times weekly; and (iii) eating fish at least once weekly.
3. *Eat fruit and vegetables daily* was defined as once or several times daily.
4. *Eat potatoes often* was defined as at least once weekly.
5. *Eat less candy* was defined as once weekly or less.
6. *Drink syrup and soft drinks only for special occasions* was defined as soft drinks with sugar once weekly or less.
7. *Breakfast is the best start on the day* was defined as eating breakfast every day on schooldays.
8. *Eat a home-made hot meal every day* was not included, instead eating precooked dinners four times weekly or more often was used.

Table 1 The general Greenlandic food recommendations

Operationalized	Vary your diet
	Eat Greenlandic foods, eat fish often
	Eat fruit and vegetables daily
	Eat brown bread, hulled grains every day.
	Eat potatoes, rice or pasta often
	Eat less sugar, candy, chips and cakes
	Drink water. Drink syrup and soft drinks only for special occasions
	Eat often, but not much. Breakfast is the best start on the day
	Make dinner the family gathering. Eat a home-made hot meal every day
	Eat fat with care
Not operationalized	Be physically active at least one hour a day

Data were from the Health Behaviour in School-aged Children (HBSC) survey in 2006 including children aged 11 to 17 years (grades 6 to 11). HBSC is a cross-national survey on child and adolescent health and health behaviour that collects data from forty countries and regions in Europe, North America and Israel. It is performed every four years⁽¹⁴⁾. The data set included 2462 students, corresponding to more than 40% of all Greenlandic schoolchildren in grades 6 to 11. The participation rate in the participating schools was 67%⁽¹⁵⁾. The survey included questions on food frequency originally developed for the HBSC questionnaire⁽¹⁶⁾ and for the Greenlandic health survey in 1993/4⁽⁹⁾.

The HBSC included the following questions.

1. 'How often do you eat...?' asked for seal, whale, wild birds, fish, reindeer, musk ox, hare, lamb, potatoes and precooked dinners (e.g. spring rolls, canned foods), with the response categories: 'every day', '4–6 times a week', '1–3 times a week', '2–3 times a month', '1 time a month or less' and 'never'.
2. 'How many times a week do you usually eat or drink...?' asked for fruits, vegetables, sweets (candy or chocolate) and coke or other soft drinks that contain sugar, with the response categories: 'never', 'less than once a week', 'once a week', '2–4 days a week', '5–6 days a week', 'once a day', 'every day' and 'every day, more than once'.
3. 'How often do you usually have breakfast (more than a glass of milk or fruit juice)?' with the response categories: 'I never have breakfast during weekdays', 'one day', 'two days', 'three days', 'four days' and 'five days'.

Habitation

The child's place of living was included as a measure of the general local availability of foods. The living place was categorized into Nuuk (the capital), towns and villages. The proportion of participants in the capital, towns and villages was 21.6%, 58.6% and 19.8%, while the proportion of the child population was 22.6%, 58.1% and 19.3%, respectively. Town status depended not only on having 1000 inhabitants or more, but also on having the local hospital and the administrative and educational centre.

Family affluence

The family's affluence was measured by the Family Affluence Scale (FAS) developed by Currie *et al.*⁽¹⁷⁾. Several studies have shown that FAS is a valid measure of the family's socio-economic position⁽¹⁷⁾. FAS includes four items on material assets in the family: own bedroom (yes, no), family car (none, one or more), number of computers (none, one, several) and holidays during the past year (none, one, several). FAS was categorized into three levels, high (scores 6–7), medium (scores 3–5) and low (scores 0–2)⁽¹⁵⁾. Students with missing information on FAS (10.1%) were excluded from the analysis. Of the remaining participants, 20.3% had low FAS, 30.3% had medium FAS and 49.5% had high FAS.

Statistical analysis

Statistical analyses were performed using the SPSS statistical software package version 15.0 (SPSS Inc., Chicago, IL, USA) using the χ^2 test and multiple logistic regression. The regression analyses included three steps: (i) multiple logistic regression analysis with each of the dichotomous diet items as outcome measures and place of living as an independent variable (Model 1); (ii) Model 1 adjusted for age and gender (Model 2); and (iii) Model 2 adjusted for FAS (Model 3). The analyses in Model 1 were repeated stratified by gender, age group and FAS.

Results

Proportion of students complying with national dietary guidelines

The proportion of students complying with the national dietary guidelines varied from 14% to 87% depending on the food item (Table 2).

Diet variation. A mean of 87.0% had a varied intake of local meats, but a smaller proportion of the younger children ($P < 0.001$), low FAS children ($P < 0.001$) and children in villages ($P < 0.001$) had a varied diet.

Intake of marine mammals. Marine mammals were eaten one to three times weekly by 31.6%, although by a higher proportion of boys than girls ($P = 0.01$), of low FAS children ($P < 0.001$) and of village children ($P < 0.001$).

Intake of local terrestrial animals and birds. While mean of 37.1% of children ate local terrestrial animals at the recommended level, a lower proportion was found in the older children ($P < 0.001$) and a higher proportion in high FAS children ($P < 0.04$).

Fish at least once weekly. A mean of 31.8% had a weekly intake of fish, but the proportion with a weekly intake was higher in the youngest children ($P < 0.001$), low FAS children ($P < 0.001$) and children in villages ($P < 0.001$).

Daily fruit. Only 14.3% of children ate fruit every day, but a higher percentage of the youngest children ($P < 0.001$) and children in the capital ($P < 0.001$) consumed fruit daily.

Daily vegetables. Vegetables were eaten daily by 38.9% of the children; whereas a higher proportion of girls ($P < 0.001$) ate eat vegetables daily, a lower proportion of village children ($P = 0.004$) and low FAS children ($P = 0.006$) were daily consumers.

Potatoes weekly or more often. A mean of 79.7% of children ate potatoes weekly or more often. A higher proportion of the older children ($P < 0.001$), girls ($P < 0.001$) and high FAS children ($P < 0.001$), and a lower

Table 2 Percentage compliance with the Greenlandic diet recommendations among students (*n* 2462) aged 11 to 17 years, (Greenland) Health Behaviour in School-aged Children (HBSC) survey, 2006

	Diet variation*	Intake of marine mammals†	Intake of local terrestrial animals and birds‡	Fish at least once weekly	Daily fruit	Daily vegetables	Potatoes weekly or more often	Candy weekly or less often	Soft drinks weekly or less often	Breakfast all weekdays	Precooked dinners less than four times weekly
All	87.0	31.6	37.1	31.8	14.3	38.9	79.7	14.7	18.6	58.6	83.4
11–12 years	84.3	40.2	39.4	38.1	18.3	41.5	76.0	15.6	22.5	64.4	84.4
13–14 years	85.6	30.5	36.3	33.0	13.3	37.8	78.9	15.0	16.5	61.4	82.5
15–17 years	92.0	22.8	31.1	23.0	10.7	37.5	84.8	12.5	16.6	48.5	83.7
	<i>P</i> < 0.001	<i>P</i> < 0.001	<i>P</i> < 0.001	<i>P</i> < 0.001	<i>P</i> < 0.001	<i>P</i> = 0.2	<i>P</i> < 0.001	<i>P</i> = 0.3	<i>P</i> = 0.003	<i>P</i> < 0.001	<i>P</i> = 0.6
Boys	85.7	34.0	38.9	33.2	13.5	34.7	76.6	15.5	16.7	58.2	83.1
Girls	88.2	29.3	35.4	30.3	15.0	42.9	82.7	13.9	20.4	59.0	83.6
	<i>P</i> = 0.07	<i>P</i> = 0.01	<i>P</i> = 0.09	<i>P</i> = 0.1	<i>P</i> = 0.3	<i>P</i> < 0.001	<i>P</i> < 0.001	<i>P</i> = 0.3	<i>P</i> = 0.02	<i>P</i> = 0.7	<i>P</i> = 0.8
Low FAS	84.0	41.6	33.2	36.2	12.6	31.4	74.7	18.1	23.2	52.7	81.9
Medium FAS	83.8	35.0	36.3	34.3	12.0	40.3	77.0	16.0	18.1	54.4	83.4
High FAS	89.6	26.9	40.0	29.8	15.9	39.6	84.7	12.6	17.9	64.2	83.1
	<i>P</i> < 0.001	<i>P</i> < 0.001	<i>P</i> = 0.04	<i>P</i> < 0.001	<i>P</i> = 0.07	<i>P</i> = 0.006	<i>P</i> < 0.001	<i>P</i> = 0.02	<i>P</i> = 0.05	<i>P</i> < 0.001	<i>P</i> = 0.6
Villages	77.1	34.1	37.0	42.2	12.1	31.9	67.6	14.5	17.6	45.7	18.5
Cities	87.2	24.5	37.3	31.6	12.8	41.7	81.4	16.4	19.2	59.2	17.2
Capital	94.9	12.3	36.7	23.3	19.7	37.8	86.5	10.5	17.8	69.4	13.2
	<i>P</i> < 0.001	<i>P</i> < 0.001	<i>P</i> = 1.0	<i>P</i> < 0.001	<i>P</i> < 0.001	<i>P</i> = 0.004	<i>P</i> < 0.001	<i>P</i> = 0.006	<i>P</i> = 0.6	<i>P</i> < 0.001	<i>P</i> = 0.06

FAS, Family Affluence Scale.

*Defined as less than four meals per week including seal meat, or four including wild fowl, or four including whale meat.

†Defined as eating marine mammals (seal or whale) between one and three times weekly.

‡Defined as eating local terrestrial animals (reindeer, musk ox or lamb) at least once weekly or birds between one and three times weekly.

proportion of village children ($P < 0.001$), had a weekly or higher intake.

Candy weekly or less often. While a mean of 14.7% ate candy weekly or less, a lower percentage of low FAS children ($P = 0.02$) and children in the capital ($P = 0.006$) did so.

Soft drinks weekly or less often. A mean of 18.6% of children drank soft drinks weekly or less. The youngest children ($P = 0.003$), girls ($P = 0.02$) and low FAS children ($P = 0.05$) had a higher percentage with a low intake.

Breakfast all weekdays. A mean of 58.6% ate breakfast all days of school, a higher proportion among the youngest children ($P < 0.001$), but a lower proportion of low FAS children ($P < 0.001$) and children in villages ($P < 0.001$).

Precooked dinners less than four times weekly. A mean of 83.4% ate precooked dinners less than four times weekly. There were no gender or age differences.

Multiple logistic regressions

In most cases, the associations between dietary intake and place of living were graded from the capital to villages with towns in between, also after adjusting for age, gender and FAS (Table 3).

Diet variation. The unadjusted OR for diet variation was 0.18 in villages ($P < 0.001$), with only minor changes after adjustment for age, gender and FAS.

Intake of marine mammals. The unadjusted OR for recommended intake in village children was 3.71 ($P < 0.001$), with only minor changes after adjustment for age, gender and FAS.

Intake of local terrestrial animals and birds. This showed no association with place of living.

Fish at least once weekly. Village children had a higher intake (OR = 2.40, $P < 0.001$), which remained almost unchanged after adjustment.

Table 3 Odds of complying with the Greenlandic diet recommendations by place of living among students (n 2462) aged 11 to 17 years, (Greenland) Health Behaviour in School-aged Children (HBSC) survey, 2006

		Model 1		Model 2		Model 3	
		OR	95% CI	OR	95% CI	OR	95% CI
Diet variation*	Capital (reference)	1.00		1.00		1.00	
	Towns	0.37	0.24, 0.56	0.33	0.21, 0.51	0.40	0.26, 0.63
	Villages	0.18	0.12, 0.28	0.19	0.12, 0.29	0.22	0.13, 0.35
Intake of marine mammal†	Capital (reference)	1.00		1.00		1.00	
	Towns	2.33	1.74, 3.12	2.50	1.86, 3.37	2.41	1.75, 3.33
	Villages	3.71	2.67, 5.14	3.73	2.67, 5.22	3.62	2.51, 5.22
Intake of local terrestrial animals and birds‡	Capital (reference)	1.00		1.00		1.00	
	Towns	1.01	0.82, 1.26	1.05	0.85, 1.31	1.13	0.89, 1.43
	Villages	0.99	0.76, 1.29	0.94	0.72, 1.25	1.09	0.81, 1.46
Fish at least once weekly	Capital (reference)	1.00		1.00		1.00	
	Towns	1.52	1.20, 1.92	1.61	1.28, 2.06	1.59	1.23, 2.06
	Villages	2.40	1.83, 3.16	2.29	1.74, 3.03	2.30	1.69, 3.12
Daily fruit	Capital (reference)	1.00		1.00		1.00	
	Towns	0.60	0.45, 0.79	0.61	0.46, 0.81	0.64	0.47, 0.87
	Villages	0.56	0.39, 0.81	0.54	0.38, 0.79	0.59	0.39, 0.90
Daily vegetables	Capital (reference)	1.00		1.00		1.00	
	Towns	1.18	0.95, 1.45	1.18	0.96, 1.45	1.19	0.94, 1.50
	Villages	0.79	0.59, 1.01	0.76	0.58, 1.00	0.81	0.60, 1.09
Potatoes weekly or more often	Capital (reference)	1.00		1.00		1.00	
	Towns	0.68	0.51, 0.91	0.65	0.48, 0.87	0.77	0.56, 1.06
	Villages	0.33	0.24, 0.45	0.33	0.24, 0.46	0.40	0.26, 0.54
Candy weekly or less often	Capital (reference)	1.00		1.00		1.00	
	Towns	1.68	1.22, 2.31	1.79	1.29, 2.48	1.65	1.15, 2.35
	Villages	1.45	1.00, 2.14	1.40	0.95, 2.08	1.23	0.80, 1.89
Soft drinks weekly or less often	Capital (reference)	1.00		1.00		1.00	
	Towns	1.10	0.84, 1.43	1.11	0.85, 1.45	1.02	0.77, 1.36
	Villages	0.98	0.71, 1.37	0.98	0.70, 1.37	0.83	0.57, 1.19
Breakfast all weekdays	Capital (reference)	1.00		1.00		1.00	
	Towns	0.64	0.51, 0.81	0.68	0.53, 0.86	0.82	0.63, 1.06
	Villages	0.37	0.28, 0.49	0.32	0.24, 0.43	0.40	0.29, 0.55
Precooked dinners less than four times weekly	Capital (reference)	1.00		1.00		1.00	
	Towns	1.40	1.02, 1.84	1.12	0.89, 1.51	1.44	1.10, 1.99
	Villages	1.49	1.05, 2.12	1.04	0.78, 1.39	1.49	1.01, 2.20

Model 1, crude model; Model 2, adjusted for age and gender; Model 3, adjusted for age, gender and family affluence.

*Defined as less than four meals per week including seal meat, or four including wild fowl, or four including whale meat.

†Defined as eating marine mammals (seal or whale) between one and three times weekly.

‡Defined as eating local terrestrial animals (reindeer, musk ox or lamb) at least once weekly or birds between one and three times weekly.

Daily fruit. Fruit intake was lowest in villages (OR = 0.56, $P = 0.001$), with small changes after adjustment.

Daily vegetables. Daily vegetable intake was positively associated with living in the capital ($P < 0.001$).

Potatoes weekly or more often. The unadjusted OR for eating potatoes was lower (0.33, $P < 0.001$) in village children, remaining almost unchanged after adjustment.

Candy weekly or less often. A positive association was found between living in a town and a high candy intake (OR = 1.68, $P = 0.006$).

Soft drinks weekly or less often. Intake of soft drinks showed no association with place of living.

Breakfast all weekdays. A negative association between living in a village and eating breakfast was found (OR = 0.37, $P < 0.001$), which was unchanged after adjustment.

Precooked dinners less than four times weekly. A non-significant association was found between living in a village and eating precooked dinners (OR = 1.49, $P = 0.06$).

Stratification for gender, age group and family affluence

When running Model 1 stratified for gender, age group and FAS, few significant changes were found (not shown). None of them changed the above-described general patterns.

Discussion

The results of the present study revealed that the proportion of children eating according to guidelines varied highly depending on the food item in question; from below 20% for eating fruits daily and eating candy or drinking soft drinks weekly or less to 87% of children having variation in intake of local meats. However, the compliance with the dietary guidelines differed by age group, gender, family affluence and place of living.

In general, the younger children more often followed the guidelines. A lower proportion of the oldest children ate breakfast every school day, ate fruit daily and ate marine mammals one to three times weekly, while a higher proportion drank soft drinks more often than weekly. Due to the less frequent intake of marine mammals, the oldest children had the highest proportion with variation in the intake of local meat.

More boys seemed to prefer eating local meats than girls, while more girls ate vegetables. The same gender differences in food choices have been revealed in other studies in Greenland among both adolescents and adults^(9,18) as well as in European children^(14,19). The differences, therefore,

seem to reflect a general pattern regarding food preferences between genders.

The differences in compliance with guidelines were to a high extent independent of the nutritional value of the food items, while a graded association between compliance with guidelines and place of living was revealed for many food items. The largest differences between intakes of food items were found between children living in villages and children living in the capital. The general finding was that more children in villages ate local food items often while children in the capital had a higher intake of imported food. The same relationships between habitation and food intake have been described previously among adolescents and adults. The intake of traditional foods was found to be highest in north Greenland and in the remote areas, whereas a higher intake of terrestrial animals, fruits and vegetables was found in larger cities and the capital^(6,18). The majority of adults in villages (about 80%) eat a main course of own supply at least weekly, compared with only about 20% in the capital⁽⁹⁾. The high intake of local foods in village children contributed to the higher compliance with guidelines on seal, whale and fish intake, but also to the lower diet variation found for these children.

Lack of tradition and the lower family affluence generally found in villages might explain in part why less than 60% of children are eating breakfast on all school-days and why the proportion eating breakfast daily is lowest in village children. Eating regular meals is not a tradition in Greenland and still fewer families in villages eat at specific times during the day⁽¹⁰⁾. In European countries a lower proportion of low affluence children were found to eat breakfast daily⁽¹⁴⁾. A decline in eating breakfast with increasing age was also found in our Greenlandic children. A decline in breakfast consumption with increasing age was a general finding among European children, too⁽¹⁴⁾. This pattern is thought to reflect a higher degree of independence and a less family-oriented lifestyle and thereby dietary habits when growing into adolescence.

In many industrialized countries, food distribution is dominated by larger businesses. Local shops in poorer areas are often over-priced and low on choice and quality⁽¹⁾. Among adolescents in Arctic Canada cost and availability were found to be the major barriers to healthy eating⁽²⁰⁾. Even if some general subsidization of food availability and costs exists, trade dynamics might have a potential negative impact on the supply of healthy foods in Greenland as well as in other countries.

Compared with European schoolchildren, Greenland has the lowest proportion of schoolchildren with a daily intake of fruit⁽¹⁴⁾ and data revealed that both low FAS and living in a village were associated with a low fruit intake. That fruit is an imported food item cannot explain the finding, because regarding the intake of both soft drinks and sweets, a high proportion of Greenlandic children,

independent of the place of living, have a daily intake comparable to that of children in other European and North American populations⁽¹⁴⁾.

It is known that less fruits are consumed in less affluent municipalities in Greenland⁽⁶⁾. Even if common fruits are sold in most habitations today, the availability (and quality) is still higher and the cost of fruits is lower in cities and the capital. Differences in availability and affordability contribute to pass on the tradition of low fruit intake to the child generation. The associations between fruit intake, availability and affluence are not a unique Greenlandic finding. In several European countries, low family affluence is associated with a low intake of fruits among children⁽¹⁴⁾; and in the USA low availability of fruits in the home was associated with low fruit intake⁽²¹⁾.

The questionnaire used in the present study provides data on food frequency intake, but not on quantity. It is therefore inappropriate to use it for calculation of energy and micronutrient distribution in the diet. However, despite its limitations, the study provided useful knowledge on compliance with the national dietary guidelines for Greenlandic children.

The study's results show that there is potential for improving schoolchildren's compliance with the national dietary guidelines in Greenland. Despite the high intake of local foods taken as a whole, children in villages and low affluent children were less likely to comply with the national recommendations. These groups had the lowest level of variation in intake of local meats, fewer of them ate breakfast daily, fruits daily and potatoes often, and at the same time a high proportion of them had a frequent intake of sweets and soft drinks. The study indicates that factors such as local availability and cost are important to the use of both imported and local foods; and that a complex relationship between compliance with dietary recommendations, family affluence, household food traditions and local availability of foods exists. The study's findings should be taken into consideration when promoting the national guidelines in the future.

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Board, University of Edinburgh and databank manager Oddrun Samdal, University of Bergen, Norway.

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