

Prevalence of self-reported middle ear disease, hearing loss and vertigo in two adult population-based cohorts over a 20-year period in Greenland

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ABSTRACT

To estimate the frequencies of self-reported middle ear and hearing complaints and vertigo/dizziness in adult Greenlanders. Furthermore, to examine if there has been a development in the frequency of these complaints within a 20-year period. A structured questionnaire concerning middle ear disease and related neuro-otological symptoms was mailed to 400 randomly selected adult Greenlanders between 18 and 60 years of age in 1995. In 2014, the questions were included for the same age group in the general Greenlandic Health Survey. The questionnaires contained a total of six identical questions. In 1995, 281 participants (70%) replied to the questionnaire. In 2014, 1,639 participants (78%) replied. We found that in 1995 the two youngest age groups (18–29- and 30–39-year-olds) had the highest relative number of ear discharge. Approximately one-third of the participants in these two age groups reported to have had ear discharge, while this was only reported by 17% of the 18–29-year-olds and 16% of the 30–39-year-olds in 2014 (95% CI [0.03, 0.3] and [0.1, 0.3], respectively). The oldest age group indicated the lowest relative number of experiences of ear discharge in both 1995 and 2014 (18% and 17%, respectively). In 1995, 30% in the age group 30–39-year-olds reported hearing loss, whereas only 18% reported hearing loss in 2014 ($p < 0.05$, 95% CI [-0.003, 0.2]). There was no significant difference in reported ear discharge since childhood and otitis media in childhood among the age groups between 1995 and 2014. However, in 1995 significantly more females had experienced ear discharge in the age groups 18–29 and 30–39 year-olds compared to 2014. Females in the age group 18–29 year-olds also showed a significant difference in having experienced otitis media in childhood, where 32% answered “yes” in 1995, and 18% answered “yes” in 2014 ($p < 0.05$). In 2014, females reported more frequent complaints of vertigo compared to males, 16% and 9%, respectively ($p < 0.05$). In 1995, there was no significant difference in experienced vertigo between males and females. Ear and hearing health problems and vertigo are reported frequently in the Greenlandic population. Overall, a tendency of less complaints in 2014 compared to 1995 except for vertigo. It is important to follow this trend and increase the prophylactic efforts to reduce common health disabilities like early otitis media in childhood and noise created symptoms even more.

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Introduction

Otitis media (OM) in all forms is very frequent in the Arctic Inuit populations as well as in other indigenous populations [1,2]. Chronic OM (COM) is a burden in these populations causing chronic suppuration, hearing loss (HL) and social disability [2,3]. COM without suppuration (dry perforations) and COM sequelae have been reported with high prevalence rates (15–17%) in Inuit children [2,3]. Furthermore, these diseases have also been found to affect between 8% and 18% of adult Greenlanders [4]. HL is also prevalent, and 19% of Greenlandic school children have been found to have HL greater than 20 dB in the

speech reception threshold [5]. HL in adult Greenlanders has mainly been attributed to noise traumas from rifles, snowmobiles and motorboats [6,7]. Studies concerning these matters in Arctic areas are predominantly cross-sectional, involving only smaller populations in selected districts.

Greenland has a population of approximately 56,000 people consisting of close to 50,000 people born in Greenland and 6,000 from other countries, mainly Danes. Health care is free of charge and is divided into five regions with smaller hospitals and one large referral hospital in the capital Nuuk. More than half of the population of the age group between 25 and

64 years does not have education above the lower-secondary level, compared to about ¼ in other Nordic countries [8].

In a health survey of 1,728 adult Greenlanders aged 18–60 years 26% reported problems with hearing (more often in males), 5% reported ear pain or ear discharge and 5% used hearing aids. In people older than 60 years, 34% of males and 24% of females reported hearing problems, and in total 12% of these used hearing aids. People living in small settlements had more hearing problems [9].

OM is largely taken as a childhood disease, and the common postulate is that infectious middle ear problems cease during the sixth to eighth living years but sequelae may remain. Cayé-Thomasen et al. (1995) found in a Danish cohort study that between 6% and 24% had tympanic membrane sequelae after long-term follow-up after myringotomy and ventilation tube insertion due to OM in childhood [10]. In populations with high risk of OM, as in, e.g. Greenland, it is not well documented to what extent OM in childhood is related to OM sequelae and middle ear problems in adulthood. Furthermore, OM and HL are often associated with other neuro-otological symptoms such as vertigo/dizziness and tinnitus.

Vertigo and dizziness are very frequent complaints in many populations. It has been estimated that between 15% and 35% of a population will suffer from this at some point in life [11]. Thus, in the United States, it was found in a national health interview survey that 24.2 million adults (corresponding to 11.1% of the included individuals) had experienced vertigo/dizziness during the past 12 months [12]. In total, 19.6% of the elder people above 65 years of age reported problems with dizziness or unsteadiness during the last 12 months [13]. Women were more frequently affected than men (21% vs. 18%). Similar results have been found in other studies [14,15]. The resulting functional status associated with HL and vertigo/dizziness in adults leads to

a reduced quality of life and prevents people from participating in social events, exercise, driving, and more [13,16].

These symptoms and their association with OM in childhood or present OM sequelae have not been examined in the Greenlandic adult population.

Therefore, this selected population-based study examines the frequency of self-reported middle ear related and hearing complaints in adult Greenlanders along with questions related to childhood middle ear disease. Furthermore, we examine if there in a 20-year period is a development in the frequency of these complaints between age groups and gender.

Subjects and methods

Structured questionnaires concerning ear disease, hearing loss and related neuro-otological symptoms were mailed to randomly selected adult Greenlanders in 1995 and in 2014. The questionnaires contained in total six identical questions concerning middle ear diseases including neuro-otologic symptoms. The questions are listed in Table 1. The questions were presented in Greenlandic and Danish but were not validated.

In 1995, the questionnaire was sent to 400 adults born and living in Greenland. The people were chosen systematically from the Danish Population Register, which includes all Greenlanders. The selection procedure was the first 400 persons between 18 and 60 years of age by the 24th of August 1994 with birthday the 23rd in a month. All were born and living in Greenland. The questionnaire was sent by mail twice in case of no response, the first time in both a Greenlandic and a Danish language version.

In 2014, the same questions about middle ear diseases, including neuro-otologic symptoms, were included in the general Greenlandic health survey, HB2014 [9]. The participants were a random sample from previous population health surveys in Greenland

Table 1. The distribution of age and gender in 1995 responders and non-responders and the background population in Greenland. The p-values are calculated using Chi-squared test with Yates correction testing if the responding group reflects the background population. Significance level $p < 0.05$.

	1995						p
	Responders		Non responders		Population*		
	n	%	n	%	n	%	
M/F	135/146	48/52	68/51	57/43	15,337/14,158	52/48	0.483/0.471
Age in years							
18–29	96	34	44	37	10,618	36	0.702
30–39	91	32	37	31	9,143	31	0.764
40–49	53	19	20	17	5,309	18	0.815
50–60	41	15	18	15	4,424	15	0.935
Total	281	100	119	100	29,495	100	

*Born in Greenland.

(1993–94, 1999–2001, 2005–2010) and an additional new sample from the population aged 18–24 years selected randomly from the Danish Population Register. We chose to use a new sample in 2014 as we expected a high number especially of the older generation who participated in 1995 would not be able to participate in 2014. We also had the opportunity to be part of a new health survey in 2014.

The 2014 survey was a combination of interview and self-administered questionnaire. The participants chose by themselves if the interview and questionnaire were in Greenlandic or Danish and 96% chose Greenlandic. Ethnicity in 2014 was based on the primary language and self-identification [9].

Statistical tests including Pearson's Chi-squared test with Yates correction, and level of significance was chosen at p -value < 0.05 and 95% Confidence Intervals (CI) were calculated at significant values.

Both studies were approved by the Commission for Scientific Research in Greenland (Ref. No. 5.113/75 and HB2014)

Results

Cohort differences 1995 vs 2014

In 1995, a total of 281 people responded to the questionnaire sent out by mail (Table 1). Out of the 281 participants corresponding to a response rate of 70%, 135 (48%) were male and 146 (52%) were female. The distribution corresponded well to the background population, where 52% were males and 48% were females. There was no significant gender difference between the responders in the different age groups and the background population.

In 2014, a total of 1,639 people answered the questionnaire included in the health survey (Table 2). This was corresponding to a response rate of 78%. Of the responders 598 (36%) were males and 1,041 (64%) were females. Unlike in 1995, the number of responders did not correspond well with the background population, and the difference was significant.

Gender differences: Table 3 shows that in 1995, 27% of the male responders and 30% of the female responders

Table 2. The distribution of age and gender in 2014 responders and the background population in Greenland. The p -values are calculated using Chi-squared test with Yates correction testing the distribution differences between the responding group and the background population. Significance level $p < 0.05$.

	2014				
	Responders		Population**		p
	n	%	n	%	
M/F	598/1041	36/64	18,981/16,695	53/47	<0.001
Age in years					
18–29	301	18	10,626	30	<0.001
30–39	221	13	7,038	20	<0.001
40–49	504	31	8,918	25	<0.001
50–60	613	37	9,094	25	<0.001
Total	1,639	100	35,676	100	

**Born in Denmark or Greenland

Table 3. Shows the distribution of answers in the 1995 and 2014 cohorts, respectively, according to sex. The p -values are calculated using Chi-squared test with Yates correction testing significant differences between the number of persons answering “yes” to the questions in 1995 and 2014. *Only replied if “yes” to question no. 1. Significance level $p < 0.05$ and 95% CI was calculated on significant values.

	1995			2014		
	Male	Female	p[95% CI]	Male	Female	p[95% CI]
	n (%)	n (%)		n (%)	n (%)	
Have you ever had ear discharge?	36 (27)	43 (30)	0.735	122 (21)	175 (17)	0.089
Have you had ear discharge within the last 6 months?*	11 (8)	13 (9)	0.990	33 (6)	62 (6)	0.192
Have you had ear discharge since childhood?	27 (21)	24 (18)	0.557	132 (22)	177 (17)	0.016[0.01, 0.1]
Did you have otitis media in childhood?	28 (22)	41 (29)	0.224	146 (25)	203 (20)	0.026[0.01, 0.1]
Do you suffer from vertigo more than twice a week?	16 (13)	28 (20)	0.136	55 (9)	159 (16)	<0.001[-0.1, -0.03]
Are you bothered from hearing loss?	39 (30)	34 (24)	0.306	196 (33)	264 (26)	<0.002[0.03, 0.01]

Table 4. Shows 1995 and 2014, respectively, and the number of persons who answered “yes” according to age groups. The p-values are calculated using Chi-squared test with Yates correction for each age group testing if there are significant differences between the number of persons answering yes in 1995 and 2014. *Only replied if “yes” to question no. 1. Significance level $p < 0.05$ and 95% CI was calculated on significant values.

	Age 18–29 years		Age 30–39 years		Age 40–49 years		Age 50–60 years		p[95% CI]
	1995 n (%)	2014 n (%)	1995 n (%)	2014 n (%)	1995 n (%)	2014 n (%)	1995 n (%)	2014 n (%)	
Have you ever had ear discharge?	29 (31)	51 (17)	29 (33)	35 (16)	14 (26)	108 (22)	7 (18)	103 (17)	0.889
Have you had ear discharge within the last 6 months?*	6 (6)	17 (27)	11 (13)	11 (5)	5 (10)	34 (7)	2 (5)	33 (28)	$0.017[-0.3, -0.1]$
Have you had ear discharge since childhood?	20 (22)	57 (19)	18 (22)	41 (19)	11 (22)	99 (20)	2 (5)	112 (19)	0.836
Did you have otitis media in childhood?	23 (25)	63 (21)	28 (31)	45 (21)	12 (23)	111 (23)	6 (15)	130 (21)	0.934
Do you suffer from vertigo more than twice a week?	16 (17)	39 (13)	14 (16)	26 (12)	7 (13)	63 (13)	7 (19)	86 (14)	0.938
Are you bothered from hearing loss?	20 (22)	60 (20)	26 (30)	40 (18)	16 (30)	132 (27)	11 (28)	228 (38)	$0.043[-0.003, 0.2]$

Table 5. Shows the distribution of male “yes” answers of the 1995 and 2014 cohorts, respectively, according to age groups. The p-values are calculated using Chi-squared test with Yates correction for each age group testing if there is a significant difference between the number of persons answering yes in 1995 and 2014. *Only replied if “yes” to question no. 1. Significance level $p < 0.05$ and 95% CI was calculated on significant values.

	Age 18–29 years			Age 30–39 years			Age 40–49 years			Age 50–60 years		
	1995	2014	p[95% CI]	1995	2014	p[95% CI]	1995	2014	p[95% CI]	1995	2014	p[95% CI]
	n (%)	n (%)		n (%)	n (%)		n (%)	n (%)		n (%)	n (%)	
Have you ever had ear discharge?	11 (28)	21 (20)	0.392	15 (37)	13 (19)	0.073	9 (27)	42 (25)	0.970	1 (6)	46 (18)	0.288
Have you had ear discharge within the last 6 months?*	2 (5)	5 (5)	0.717	6 (15)	4 (6)	0.233	3 (10)	14 (8)	0.910	0 (0)	10 (4)	NA
Have you had ear discharge since childhood?	7 (18)	25 (24)	0.668	12 (32)	17 (25)	0.616	7 (21)	36 (22)	0.851	1 (6)	54 (22)	0.215
Did you have otitis media in childhood?	6 (15)	28 (26)	0.242	15 (37)	14 (21)	0.108	6 (19)	39 (22)	0.855	1 (6)	65 (26)	0.097
Do you suffer from vertigo more than twice a week?	2 (5)	9 (8)	0.746	4 (10)	5 (7)	0.904	6 (18)	17 (10)	0.309	4 (25)	24 (10)	0.127
Are you bothered from hearing loss?	7 (18)	27 (25)	0.467	15 (38)	12 (18)	0.384	11 (33)	51 (31)	0.911	6 (33)	106 (42)	0.613

had experienced discharge from the ear during their lifetime. Less than 10% of those had experienced ear discharge within the last 6 months. In 2014, 21% of male responders and 17% of female responders had experienced ear discharge during their lifetime, but only 6% had experienced ear discharge within the last 6 months. There was no significant difference in distribution between males and females in any of the replies to the questions in 1995. In 2014 male and female responders showed no significant difference in responses in questions 1 and 2. However, more males than females had experienced ear discharge since childhood and reported a significantly more frequent experience of otitis media in childhood in 2014 (95% CI [0.01, 0.1] and [0.01, 0.1], respectively). The responders in 2014 also showed a significant difference between

male and females in frequency of experienced vertigo and by being bothered from hearing loss (95% CI [-0.1, -0.03] and [0.03, 0.01], respectively). Females experienced vertigo more frequently than males (16% vs. 9%), and males reported more frequently to be bothered by hearing loss than females. In 1995, there was no significant difference between males and females who had experienced vertigo and/or hearing loss.

Age differences: Table 4 gives an overview of the distribution of symptoms in the different age groups. It shows that in 1995 the two youngest age groups (18–29- and 30–39-year-olds) had the highest relative number of ear discharge. Approximately one-third of the participants in these two age groups reported to have had ear discharge, while this was only reported by 17% of the 18–29-year-olds and 16% of the 30–39-year-olds

Table 6. Shows the distribution of females answering “yes” to the questions in the 1995 and 2014 cohorts, respectively, according to age groups. The p-values are calculated using Chi-squared test with Yates correction for each age group testing if there is a significant difference between the number of persons answering “yes” in 1995 and 2014. *Only replied if “yes” to question no. 1. Significance level $p < 0.05$ and 95% CI was calculated on significant values.

	Age 18–29 years			Age 30–39 years			Age 40–49 years			Age 50–60 years		
	1995	2014	p [95% CI]	1995	2014	p [95% CI]	1995	2014	p [95% CI]	1995	2014	p [95% CI]
	n (%)	n (%)		n (%)	n (%)		n (%)	n (%)		n (%)	n (%)	
Have you ever had ear discharge?	18 (33)	30 (16)	0.007 [0.03, 0.3]	14 (30)	22 (15)	0.031 [-0.004, 0.3]	5 (25)	66 (20)	0.821	6 (27)	57 (16)	0.293
Have you had ear discharge within the last 6 months?*	4 (8)	12 (6)	0.988	5 (11)	7 (5)	0.248	2 (10)	20 (6)	0.829	2 (9)	23 (6)	0.971
Have you had ear discharge since childhood?	13 (25)	32 (17)	0.275	6 (14)	24 (16)	0.898	4 (25)	63 (19)	0.814	1 (5)	58 (16)	0.240
Did you have otitis media in childhood?	17 (32)	35 (18)	0.048 [-0.01–0.3]	13 (27)	31 (21)	0.451	6 (30)	72 (22)	0.584	5 (23)	65 (18)	0.815
Do you suffer from vertigo more than twice a week?	14 (26)	30 (16)	0.127	10 (22)	21 (14)	0.296	1 (5)	46 (14)	0.454	3 (14)	62 (17)	0.938
Are you bothered from hearing loss?	13 (25)	33 (17)	0.320	11 (23)	28 (19)	0.648	5 (25)	81 (25)	0.802	5 (23)	122 (34)	0.374

in 2014 (95% CI [0.03, 0.3] and [0.1, 0.3], respectively). The oldest age group indicated the lowest relative number of ear discharge in both 1995 and 2014 (18% and 17%, respectively).

In 2014, almost one-third of those who had experienced ear discharge of the 18–29 year-olds and 50–59-year-olds had experienced it within the past 6 months.

In the age group of 18–29-year-olds, there was a significant difference between questions 1 and 2 (95% CI [0.03, 0.3] and [-0.3, 0.1], respectively); otherwise, there were no significant differences in the replies to the questions for this age group.

The age group 30–39 year-olds showed significant difference in question no. 6 (95% CI [-0.003, 0.2]); thus, 30% reported hearing loss in 1995, whereas only 18% reported hearing loss in 2014.

Table 5 shows that there were no significant differences between the male replies in general in 1995 and in 2014.

Table 6 illustrates significantly more females who had experienced ear discharge in the age groups 18–29- and 30–39-year-olds in 1995 compared to 2014 (95% CI [0.03, 0.3] and [-0.004, 0.3], respectively). The 18–29-year-olds also showed a significant difference in having experienced otitis media in childhood, where 32% answered “yes” in 1995 and 18% answered “yes” in 2014, 95% CI [-0.01–0.3].

Discussion

This survey consists of two separate studies that contained the same questions. This enabled comparison of the development in self-reported ear-related health problems in Greenland over time and in this case over 20 years. Compared to 1995 it was possible to obtain a higher response rate in 2014, due to the fact that the questionnaire was distributed during the General Health Survey. We found a significant difference in age distribution between responders and target population in 2014 (see Table 2). Also, there was a higher response rate among females than males in 2014. This was due to 2.5 times more females than males participated in the health survey in 2014. This hampers the general compatibility between answers in 1995 and 2014 except when comparing between genders. Also, the possibility to generalize to the background population must be taken with care in the 2014 survey. In both groups, the majority of participants were female. In 2014, the number of observations varied more across gender compared to 1995. It is well known from many population-based health surveys that males have a lower participation rate.

The specific questions are discussed separately below:

(q1) Have you had ear discharge?

Answers indicate that among both males and females in 2014, fewer had experienced ear discharge during their lifetime compared to 1995 (see Table 3). Table 4 shows that the relative number of participants who suffered from ear discharge in the two youngest age groups was almost halved in 2014 compared to 1995 and overall there was less ear discharge in all age groups in 2014.

Although health-care initiatives such as vaccination, reduction of smoking, better living conditions and easier access to health care all came relatively late in Greenland, this reduction in reported ear discharge is probably best explained by improved socioeconomic living conditions in the last 30 years. The GDP in Greenland has increased from 6.4 million DKR to 11.5 million DKR [17,18].

(q2) Have you had ear discharge within the last 6 months?

In 1995, the highest relative number of participants who had suffered from recent ear discharge was observed in the age group 30–39 year-olds (13%). In all other age groups 10% or less indicated that they had symptoms. Tables 5 and 6 show that males and females answered very similar except in the oldest age group, where females indicated a higher frequency of ear discharge than males in 1995.

Table 4 shows that in 2014 the highest relative number of participants who had suffered from recent ear discharge was found in the age group of 50–60 years (28%). Males and females answered very similar across age groups (see Table 5 and 6). Recent ear discharge was significantly less reported in 2014 compared to 1995 except for the age group 30–39 year-olds (see Table 4). This is in line with the results of q1 and is probably best explained by increased socioeconomic living conditions over the last 30 years.

(q3) Have you had ear discharge since childhood?

In 1995, about 20% reported that they had had ear discharge since childhood. This was similar across all except the oldest age group. In this group only 5% indicated that they had suffered from ear discharge since childhood. The youngest females more frequently indicated that they had suffered from ear discharge compared to the youngest males (see Table 5 and 6). This was opposite for the age group 30–39-year-olds. In 2014, about 20% in all age groups indicated that they had suffered from ear discharge since childhood (see Table 4). In all age groups, the males more frequently answered that they had suffered from ear discharge since childhood (see Table 5 and 6). Thus, the frequency of participants who indicated to suffer from ear discharge since childhood is similar in 1995 and 2014

except in the oldest age group, where the frequency was much higher in 2014 relative to 1995 (table 4).

(q4) Did you have otitis media in childhood? In 1995, almost one-third in the age group 30–39 year-olds indicated OM in childhood, which was the highest frequency in the surveys. The lowest frequency was found in the age group 50–60 years where only 15% indicated OM in childhood (see Table 4). The frequency of females that answered that they had OM in childhood was higher compared to males in all age groups except the age group 30–39 year-olds (see Table 5 and 6). In 2014 only 21–23% of the participants indicated OM in childhood in all age groups (see Table 4). The relative number of males that answered that they had OM in childhood was higher compared to females in all age groups except the age groups 30–49 year-olds where the relative number was equal (see Table 5 and 6).

(q5) Do you suffer from vertigo more than twice a week? In 1995, approximately the same proportion of participants indicated to suffer from vertigo more than twice a week in all age groups. The highest proportion was found in the oldest age group (19%) (see Table 4). Every fourth female in the two youngest age groups answered that they suffered from vertigo (see Table 6). This frequency is much higher than the frequency reported by young males (5–10%; see Table 5). In the two oldest age groups more males reported to suffer from vertigo compared to females (see Table 5 and 6).

In 2014, 12–14% of the participants indicated vertigo more than twice a week in all age groups (see Table 4). Relatively fewer participants indicated that they suffered from vertigo in 2014 compared to 1995 (see Table 3). This was however not significant. In both 1995 and 2014 there were similar proportions of participants who suffered from vertigo in all age groups (see Table 4). Females reported more often to suffer from vertigo in all age groups (see Table 5 and 6). Vertigo is a common symptom and is usually found in population-based studies reported in the older age groups, especially from 60 years and more. This was, however, not the case in this survey. It may be that vertigo is experienced differently between the age groups and thus indicates different pathogenesis. Autonomous neuropathy, e.g. is mainly present in the elderly compared to young people. The question in this survey does not differentiate between the different experiences of vertigo, thus we do not know the pathogenesis nor the level of experience of vertigo between the different age groups.

(q6) Are you bothered by hearing loss? In 1995, the frequency of participants who indicated to be bothered by hearing loss was similar in the three oldest age groups (28–31%). In the youngest age group 22%

indicated hearing loss (see Table 4). Males more often reported hearing loss compared to females except in the youngest age group (see Table 5 and 6). In 2014, the proportion of participants who indicated hearing loss increased with age (except between the two youngest age groups). In the age group of 50–60-year-olds, the frequency was 38%, and in the youngest age group, the frequency was 20% (see Table 4). Males more often reported hearing loss compared to females—except in the second youngest age group (see Table 5 and 6). Although still frequent, there was a significant reduction from 1995 to 2014 in participants who reported hearing loss. This is promising and may be a result of increased use of hearing protection in noise and especially when hunting or sailing motorboats.

One of the strengths of this study is the 20-year gap between the same observations, making it possible to monitor differences in ear-related health problems. We have used the same questions to monitor the ear and hearing health and symptoms of vertigo in the Greenlandic population. However, the questions have not been validated, and thus, there is a risk of misinterpretation among the participants' responses. A validated questionnaire would have improved the study. We do not know what kind of hearing loss the questions reflect among the participants nor the level of vertigo and the impact of the daily life. The population surveyed in 2014 did not represent the background population as well as it did in 1995 and the results from the 2014 survey can therefore not readily claim to represent the whole population of Greenland. It can although be used to compare with an older population survey when divided into categories like gender and age groups. Also, self-reported symptoms may be an unreliable measure when not followed by clinical examination. Despite these drawbacks, this study indicates a reduction in self-reported infectious middle ear problems over a 20-year period and a reduction in self-reported hearing loss. Vertigo still seems frequent but without a significant change between the years. However, ear and hearing health problems are still frequent in the Greenlandic adult population, but a progression towards better ear and hearing health seems obtainable.

Conclusions

Ear and hearing health problems are reported frequently in the Greenlandic population, but there is a tendency of less complaints in 2014 compared to 1995. Vertigo complaints seem relatively unchanged. It is important to follow these trends and increase the prophylactic efforts that may reduce these common health disabilities problems even more.

Disclosure statement

No potential conflict of interest was reported by the author(s).

References

1. Homøe P, Christensen RB, Bretlau P. Prevalence of otitis media in a survey of 591 unselected Greenlandic children. *Int J Pediatr Otorhinolaryngol.* 1996;36:215–230.
2. Koch A, Homøe P, Pipper C, et al. Chronic suppurative otitis media in a birth cohort of children in Greenland: population-based study of incidence and risk factors. *Pediatr Infect Dis J.* 2011;30:25–29.
3. Jensen RG, Homøe P, Andersson M, et al. Long-term follow-up of chronic suppurative otitis media in a high-risk children cohort. *Int J Pediatr Otorhinolaryngol.* 2011;75:948–954.
4. Pedersen CB, Zachau-Christiansen B. Chronic otitis media and sequelae in the population of Greenland. *Scand J Soc Med.* 1988;16:15–19.
5. Homøe P, Christensen RB, Bretlau P. Hearing in elementary school children in Nuuk and Sisimiut, Greenland. *Arct Med Res.* 1995(54):145–150.
6. Counter SA, Klareskov B. Hypacusis among the Polar Eskimos of Northwest Greenland. *Scand J Audiol.* 1990;19:149–160.
7. Røjskjær C. Audiology in Greenland: an audiological program in a remote area. *Audiology.* 1974;13:408–413.
8. <https://stat.gl/publ/en/GF/2022/pdf/Greenland%20in%20Figures%202022.pdf>. [cited 18 Dec 2022].
9. https://www.sdu.dk/sif//media/images/sif/udgivelser/2017/29_b2014+metoderapport+final+rev.pdf. [cited 18 Dec 2022].
10. Caye-Thomasen P, Stangerup SE, Jorgensen G, et al. Myringotomy versus ventilation tubes in secretory otitis media: eardrum pathology, hearing, and eustachian tube function 25 years after treatment. *Otol Neurotol.* 2008;29:649–657.
11. Neuhauser HK. The epidemiology of dizziness and vertigo. *Handb Clin Neurol.* 2016;137:67–82.
12. Lin HW, Bhattacharyya N. Impact of dizziness and obesity on the prevalence of falls and fall-related injuries. *Laryngoscope.* 2014;124(12):2797–2801.
13. Lin HW, Bhattacharyya N. Balance disorders in the elderly: epidemiology and functional impact. *Laryngoscope.* 2012;122(8):1858–1861.
14. Olsson Möller U, Midlöv P, Kristensson J, et al. Prevalence and predictors of falls and dizziness in people younger and older than 80 years of age—a longitudinal cohort study. *Arch Gerontol Geriatr.* 2013;56(1):160–168.
15. Stevens KN, Lang IA, Guralnik JM, et al. Epidemiology of balance and dizziness in a national population: findings from the English Longitudinal Study of Ageing. *Age Ageing.* 2008;37(3):300–305.
16. Gopinath B, McMahon CM, Rochtchina E, et al. Dizziness and vertigo in an older population: the Blue Mountains prospective cross-sectional study. *Clin Otolaryngol.* 2009;34(6):552–556.
17. <https://stat.gl/publ/en/GF/2002/content/Greenland%20in%20Figures%202002.pdf>. [cited 18 Dec 2022].
18. <https://stat.gl/publ/kl/GF/2014/pdf/Greenland%20in%20Figures%202014.pdf>. [cited 18 Dec 2022].