

ORIGINAL RESEARCH ARTICLE



Integrating sensory assessments in preventive home visits: a cross-sectional study of the Faroe Islands

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ABSTRACT

Background: Sensory impairments, including hearing and vision loss, are common in older adults and can affect quality of life. This study examines the integration of hearing and vision assessments in preventive home visits (PHVs) for older adults in the Faroe Islands, comparing outcomes between urban and rural settings.

Aim: To evaluate the feasibility of including sensory assessments in PHVs and compare sensory measurements between Tórshavn (urban) and rural districts.

Methods: A cross-sectional study with 175 participants aged 76 was conducted in Tórshavn and five rural areas. Data included demographics, self-assessments, and clinical evaluations using standardized tools.

Results: Visual impairments were slightly more prevalent in rural areas, while hearing impairments showed no significant differences. Discrepancies between self-reported and measured impairments emphasized the importance of objective assessments. Sensory screenings during PHVs improved early detection and highlighted inequities in access to specialized services.

Conclusion: Integrating sensory assessments in PHVs is feasible and beneficial, addressing disparities between urban and rural areas. These screenings support equitable healthcare and early intervention, promoting better quality of life for older adults across diverse settings.

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Introduction

The global ageing population shows unprecedented growth, particularly among the oldest of the old, with significant implications for public health. According to the United Nations' population projections, the number of people aged 65 or older is expected to double by 2050 [1]. Sensory impairments, including hearing and vision loss, are common among older adults and these impairments may profoundly impact their quality of life, cognitive function and physical abilities [2–8]. Therefore, addressing these impairments is crucial for maintaining independence and well-being in later life.

This study focuses on the Faroe Islands, an archipelago and a semi-autonomous community (of Denmark) in the North Atlantic Ocean, consisting of 17 inhabited islands and a population of about 54,500 people. Twenty-nine municipalities make up the geographical, political and economic entities, of which the municipality of Tórshavn is the largest, with 22,149 inhabitants. From 2014, all municipalities except the municipality of

Tórshavn have been structured as seven municipal entities with responsibility for care and support for people aged 67 and above. Preventive home visits (PHVs) targeting community-dwelling persons aged 75 became mandatory by law in 2015, initiated to improve independence, identify risk factors concerning health, and promote health and well-being in later life. Therefore, these visits have now become part of a proactive societal action in the Faroe Islands, under municipal management [9]. In Denmark, PHVs have been mandatory since 1996.

The geographical isolation of the Faroe Islands poses significant challenges to the delivery of preventive healthcare services, including PHVs. The archipelago's remote location, dispersed population across multiple islands, and harsh weather conditions contribute to logistical difficulties in healthcare access, staff recruitment and timely delivery of services. These challenges are not unique to the Faroe Islands but are shared by other Nordic and Arctic regions with similar

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geographical and demographic characteristics. By studying the implementation and impact of PHVs in such a context, this research provides valuable insights into how healthcare strategies can be adapted to improve service delivery in isolated or rural communities. The findings can inform public health policies and practices in similar settings, promoting better management of sensory impairment and overall well-being among older adults in these regions.

The PHVs were initially primarily based on unstructured conversations between the target audience and a nurse about daily living, possible challenges and available resources [10]. This practice has been criticised for a lack of structure and ambition, and in particular for not implementing more clinical assessment tools [11–13].

The primary aim of this study is therefore to assess whether incorporating vision and hearing assessments into PHVs could contribute to combating unnecessary challenges for older adults due to hearing and/or vision impairment, particularly in rural areas where healthcare resources are often limited [14]. Besides this, we will compare the measurements from urban Tórshavn with rural districts, to measure differences and to evaluate the management of sensory impairments in different settings. Understanding possible differences will help inform targeted public health interventions and improve healthcare accessibility and quality for older adults across rural communities in the Faroe Islands and other rural settings in the circumpolar region [15].

Background

In a previous study, we investigated the prevalence and impact of sensory impairments among 76-year-olds in the capital of Tórshavn, an urban area with 22,149 inhabitants [10]. The findings highlighted significant issues related to hearing and vision impairments and their effects on quality of life [10]. Building on this foundation, the current study extends the investigation to rural areas of the Faroe Islands, comparing these findings with the urban data to obtain insight into conditions concerning hearing and vision across different settings.

The geographical isolation of the Faroe Islands poses significant challenges to the delivery of preventive healthcare services, including PHVs. The archipelago's remote location, dispersed population across multiple islands and harsh weather conditions contribute to logistical difficulties concerning healthcare access, staff recruitment and timely delivery of services [11]. These challenges are not unique to the Faroe Islands but are shared by other Nordic and Arctic regions with similar

geographical and demographic characteristics. Studying the implementation and impact of PHVs within this context provides valuable insights into how healthcare strategies can be adapted to improve service delivery in isolated or rural communities. Such findings can inform public health policies and practices in similar settings, promoting better management of sensory impairments and overall well-being among older adults.

Additionally, the Faroe Islands' unique social structure, characterised by strong family bonds and community support, plays a critical role in the care of older adults [16]. However, the healthcare system still faces significant challenges, including limited resources, long waiting lists for services, and difficulties in recruiting healthcare professionals. These issues are further exacerbated in rural areas, where geographical isolation and harsh weather conditions pose additional challenges.

Good vision and hearing are essential for maintaining quality of life, independence and social engagement in older adults [4,7]. Ensuring adequate sensory health can significantly enhance activities of daily living (ADL/IADL) and overall well-being [17,18].

Ethics

This study adheres to the ethical principles of the Helsinki Declaration (World Medical Association, 2014) and has received approval from the Faroese Data Protection Agency (dat.fo/loyvir 2017 5.5. Værkætlan: "Hoyrn, sjón og ljósvidurskipti í heiminum" and j.no.: 19/00213). All participants have given informed consent. Participants will be fully informed about the purpose of the study, the procedures involved, their right to withdraw at any time, and the confidentiality obligation concerning their data. Information sessions and consent forms will ensure that participants understand the study's aims and their rights before participating.

Design and method

The study was designed as a cross-sectional, descriptive study conducted to evaluate the integration of hearing and vision assessments into PHVs for older adults and to compare the measurements of hearing and vision obtained during PHVs in rural areas, with corresponding measurements conducted in Tórshavn, an urban setting in the Faroe Islands. Data was collected during the autumn and winter of 2019/2020 by the Preventive Team in five cooperative district or municipal entities, as described in the introduction. The selection of participants was naturally defined by the operational

framework of the study, which aimed to evaluate the feasibility and benefits of integrating vision and hearing assessments into preventive visits. The sample consisted of individuals turning 76, as preventive home visits are systematically offered to residents of that age, according to established practice in the Faroe Islands. The PHV teams used municipal registries, which provided lists of residents turning 76 that year, to identify participants. Selection was based on age alone, ensuring inclusion regardless of gender.

The study was carried out in five of the eight cooperative districts during the autumn and winter of 2019/2020. The participating districts included Nand, Nordøayne, VEKS, Vagum and Sandøyar. These areas are collectively referred to as “rural”, in comparison to Tórshavn, which is referred to as urban.

Rationale: Following the study conducted in the capital [10], other municipalities expressed interest in participating. This prompted expansion of the study to include these additional districts, to compare urban and rural differences and ensure a more comprehensive understanding of sensory impairments across the Faroe Islands.

Inclusion and exclusion criteria:

Inclusion: Participants were required to be 76 years old and residing in the participating rural districts.

Exclusion: Individuals with obvious cognitive impairments or very serious illnesses were excluded, to ensure the accuracy and reliability of self-assessments and participation in the screening process.

Data collection

As PHVs are mandatory, district nurses continuously register persons, regardless of gender, reaching the age of 76 in the community, who then receive an invitation to have a nurse visit them for a preventive visit. In connection with this invitation, they were asked whether they would participate in this study. The PHV teams had access to lists provided by the municipalities, which included residents turning 76 that year. These lists are routinely received by the teams each year.

Before the study started, nurses in the Preventive Teams underwent a special training programme consisting of approximately 16 hours of theoretical and practical instruction, to ensure consistency and accuracy in screening the participants.

A revised version of the KAS screening (Kartlegging av Alvorlig Kombinerte Sanseetap blandt elder [Screening of Serious, Combined Sensory Loss among Older People] was used. This questionnaire was chosen because it had been shown to be useful in previous studies where a combination of standardised tests and self-assessments of hearing and vision were used [10,19,20].

An otoscope was employed to inspect the eardrum and check for cerumen impaction.

Hearing was measured using a portable pure tone audiometer according to WHO recommendations.

Visual acuity was assessed using a LogMAR chart, chosen for its validity and ease of use.

We used the 4-level Likert scale when coding for self-assessment.

Statistics

Continuously and normally distributed variables are presented as means with 95% confidence intervals. Nonparametric tests were used as the groups were small. The **Mann-Whitney test** was used to test differences between two groups when the sample size was small, or the data was far from normally distributed. The **Kruskal-Wallis test** was applied to comparisons among more than two independent groups when the data was not normally distributed. When the number of participants was not too small (>30) and the danger of many extreme values was small, the t-test for comparing to groups was used.

To look for connections between categorical variables chi-square tests were used.

When looking for correlation between two continuous variables the Pearson correlation coefficient was used.

All tests were two-tailed using the null hypothesis of equality or no correlation, and the threshold for statistical significance level was set at 5% ($p < 0.05$). All computations were performed using the statistical package SPSS Statistics 28 (International Business Machines, USA).

Hearing function quantification

Hearing function was quantified using PTAV scores for the better ear:

- **<25 dB:** Normal hearing
- **25–40 dB:** Mild impairment
- **41–60 dB:** Moderate impairment
- **61–80 dB:** Severe impairment

A hearing loss of more than 40 dB is considered a disabling hearing impairment (WHO reference).

Visual Function Quantification:

In this study, we adjusted the WHO's standard classifications for visual function (VA) to better reflect age-related changes in visual acuity, which are common among older adults. Traditionally, the WHO defines normal visual acuity as 1.0 or better. However, very few

older individuals maintain this level of acuity. To adapt our analysis to the natural decline in vision that often occurs with ageing, we used the following categories:

- **Normal vision:** 0.8 or better
- **Slightly visually impaired:** 0.4–0.8
- **Visually impaired:** ≤ 0.4

This adjustment accounts for the typical variation in visual acuity in an older population and provides a more realistic assessment of visual function in this age group.

Dual Sensory Loss (DSL): DSL was defined as impairments in both hearing and vision [21,22].

Results

Demographics and education

The study included 175 participants, with 58% (101) women, all aged 76. Participants were drawn from Tórshavn (urban) (42%) and five rural districts (rural) (58%).

Educational attainment:

Educational attainment varied significantly between urban and rural areas ($p < 0.001$), with higher education levels more prevalent in Tórshavn. Specifically, 14% (24) had university education, 15.8% (27) had high-school education, 13.5% (23) had college education, and 47.4% (81) had only completed the 7th grade.

More than half, 68% ($n = 119$), of the participants were married or lived with a partner and 32% ($n = 56$) lived alone.

Hearing function

Objective measurements:

- The average hearing loss for the whole group score was 34.6 dB, classified as “light impairment” according to WHO standards.
- There was no significant difference in measured hearing impairment between urban and rural areas ($p = 0.36$).

Distribution of hearing impairment:

- In Tórshavn, 71.6% had light or moderate hearing impairment.
- In rural areas, 75.1% had light or moderate hearing impairment.
- [Table 1](#) presents the distribution of measured pure-tone average (PTA) across urban and rural areas, showing that 25% of participants had no impairment, while the majority exhibited light or moderate impairments.

Self-reported hearing:

- Approximately 50% of participants reported having good hearing.
- 47.3% from urban areas reported having good hearing.
- 52.5% from rural areas reported having good hearing.

Self-reported vs. measured hearing: There were discrepancies between self-reported and measured hearing impairment, highlighting the need for regular objective hearing tests. For instance, 18.8% of those with moderate impairment reported their hearing as good. [Table 2](#) illustrates the comparison between self-reported and clinically measured hearing, showing that while 88.1% of participants with normal hearing reported good hearing, only 18.8% of those with moderate impairment did so.

Communication difficulties

Participants frequently reported difficulties with understanding speech in noisy environments, with significant challenges noted in large group settings ($p < 0.001$). Despite these challenges, only 9 urban and 16 rural participants with hearing aids used them daily. Among those who believed they did not hear well, nearly 70% still did not use hearing aids regularly.

Visual function

Average visual acuity (VA):

- For the better eye: 0.65, indicating slight visual impairment.

Table 1. Distribution of measured pure-tone average (PTA) of participants in urban and rural areas.

Degree of hearing loss	Urban	Rural	Total
≤ 25 dB (No impairment)	27.0% (20)	22.9% (24)	25.0% (42)
25–40 dB (Light impairment)	47.3% (35)	43.8% (42)	44.6% (77)
40–60 dB (Moderate impairment)	24.3% (18)	31.3% (30)	28.6% (48)
> 60 dB (Severe impairment)	1.4% (1)	2.1% (2)	1.8% (3)

Table 2. Comparison of self-reported and clinically measured hearing impairment among participants.

Measured hearing	Self-reported hearing		Total
	Good	Not so good	
Normal	88.1% (37)	11.9% (5)	100% (42)
Light impairment	50.6% (39)	45.5% (35)	96.1% (74)
Moderate impairment	18.8% (9)	54.2% (26)	73% (35)
Severe impairment	33.3% [1]	0% (0)	33.3% [1]
Total	50.6% (86)	38.8% (66)	89.4% (152)

- For the less good eye: 0.51, with a significant difference from the better eye ($p < 0.001$).

Measured visual acuity: Measured visual acuity showed that only 10.5% had normal vision, 70.9% had slight visual impairment and 18.6% were visually impaired. Measured visual acuity is presented in Table 3.

Self-reported vision presents a completely different picture and perspective of the participants' vision.

Self-reported vision:

- 60.5% of participants reported good vision.
- 34.9% reported not so good vision.
- 4% reported poor vision.
- There was no significant difference between urban and rural areas ($p = 0.44$).
- Table 4 provides a detailed breakdown of self-reported vision by location, highlighting that a

slightly higher percentage of participants in urban areas reported good vision compared to those in rural areas.

The discrepancies are well-highlighted in Tables 5 and 6.

Table 7 shows that very few of those who perceive themselves as having good vision have measured values that support this. For example, in one of the rural areas, 18 participants claimed to have good vision, while only 1 of these had measured values indicating that vision was normal.

Diagnosed eye diseases

Dual sensory impairment

Self-reported dual sensory impairment:

- 32.7% of participants rated both their hearing and vision as good.
- 46.2% experienced some problems with either hearing or vision.
- 21.2% experienced problems with both hearing and vision.

Table 3. Measured visual acuity according to reference values.

Reference values	Tórshavn (urban)	Rural	Total
<0.4 (Visually impaired)	17.6% (13)	19.4% (19)	18.6% (32)
0.4–0.8 (Slight visual impairment)	71.6% (53)	70.4% (69)	70.9% (122)
>0.8 (Normal)	10.8% (8)	10.2% (10)	10.5% (18)

Table 4. Self-reported vision.

Self-reported vision	Tórshavn/urban	Rural	Total
Good	64.9% (48)	57.4% (58)	60.5% (106)
Not so good	29.7% (22)	38.6% (39)	34.9% (61)
Poor	4.1% (3)	4.0% (4)	4.0% [7]
Don't know	1.4% (1)	0% (0)	0.6% [1]
Total	100% (74)	100% (101)	100% (175)

Table 5. presents the association between measured VA and self-assessment of the vision function.

Visual acuity scale	Self-assessment				Total
	Good	Not so good	Bad	Do not know	
<0.4 (Visually impaired)	13.3% (14)	23.7% (14)	42.9% (3)	100% [1]	18.6% (32)
<0.4, 0.8] (Slightly visually impaired)	73.3% (77)	69.5% (41)	57.1% (4)	0.0% (0)	70.9% (122)
>0.8 (Normal)	13.3% (14)	6.8% (4)	0.0% (0)	0.0% (0)	10.5% (18)
Total	100.0% (105)	100.0% (59)	100.0% (7)	100.0% (1)	100.0% (172)

Table 6. presents numbers instead of percentages between measured VA and self-assessment of the vision function.

	Tórshavn	Rural	Total
Measured normal vision of self-reported good vision	7 of 48 (14.5%)	7 of 57 (12.3%)	14 of 105 (13.46%)

Table 7. Distribution of diagnosed age-related eye diseases by urban and rural areas.

Diagnosed eye disease	Tórshavn/urban	Rural	Total
Glaucoma	4.1% (3)	3.0% (3)	3.4% (6)
Cataract	25.7% (19)	15.8% (16)	20.0% (35)
Cataract surgery	9.5% (7)	2.0% (2)	5.1% (9)
Age-related macular degeneration (AMD)	1.4% (1)	4.0% (4)	2.9% (5)
Retinal damage	2.7% (2)	2.0% (2)	2.3% (4)
Other eye diseases	2.7% [2]	10.9% (11)	7.4% (13)

Objective measures: Objective measures indicated higher rates of impairment than self-reported data, underscoring the need for integrated sensory health services.

Discussion

This study followed up on an earlier study conducted in the capital of Tórshavn on the Faroe Islands to examine hearing and vision among people aged 75 receiving PHV [10]. From the earlier study we acknowledge that people living in the capital might not be representative of the whole country, partly because the capital has a large proportion of people with higher education and probably also offers easier access to services regarding hearing and vision examinations and aids. Studies of hearing loss and socioeconomic factors by Tsimpida et al. (2020) examined the concordance of self-reported measures of hearing difficulty with objective hearing data and associated the findings with the potential discordances among these measures across different population subgroups [23]. Their study showed that socioeconomic factors such as educational level and occupation were factors associated with older people underreporting moderate and severe hearing loss.

Our study revealed a significant difference in educational attainment between urban and rural areas, with higher education levels more prevalent in Tórshavn. However, we found no significant differences in either self-reported or measured values between findings from rural and urban areas. Regarding access to services, however, we found a significant difference in cataract surgery rates between urban and rural areas, indicating disparities in access to specialised healthcare services. Enhancing the availability of eye-care services in rural areas, including possible referral to specialists and surgery, is crucial to addressing these disparities. Our findings underscore the importance of conducting clinical assessment of hearing and vision conditions as part of PHVs. The difference between self-reported and measured values regarding vision thus showed that while 60.5% reported having normal vision, the clinical test showed that this ratio was no more than 10.5%. Regarding hearing, 50.6% who reported having good

hearing were clinically measured to be slightly impaired.

The effect of PHVs has been discussed by several researchers during the last decades. Reviews on outcomes from PHVs have shown various results. A common barrier to achieve positive outcomes has been a general lack of defined structures concerning the substance or content of the visits. A review from 2000 even stated that “if substantial improvements in effectiveness cannot be achieved, considerations should be given to discontinuing such visits” [14]. Another review by Huss et al. (2008) concluded that “*Multidimensional preventive home visits have the potential to reduce disability burden among older adults when based on multidimensional assessment with clinical examination*” [24].

In our study, we introduced clinical examination of hearing and vision as part of preventive home visits. Our intention was not to add to the large number of studies examining outcomes of PHVs, for instance regarding the possibility of postponing admission to an institution, preventing falls and reducing the number of hospital admissions [25,26]. However, by looking into studies regarding vision and hearing among older people, we found sound arguments to further examine hearing and vision abilities among people aged 75 as part of PHVs, as these abilities often deteriorate slowly with age without any effort being made to prevent consequences of this deterioration. A systematic review by Shukla et al. (2020) showed that most studies found an association between hearing loss and social isolation and/or loneliness [27]. Likewise, vision loss is a risk factor regarding falls for older people and is one of the most easily overlooked risk factors because the process of deteriorating vision is slow and unnoticeable in most older adults. Several studies have found that impaired visual acuity increases the risk of falls and injuries [28,29].

Although our findings underscore the importance of adding clinical assessment of hearing and vision ability to improve outcomes of PHVs, it is important to draw attention to some limitations regarding this study:

Sample size and statistical power

One of the primary methodological limitations of our study is the relatively small sample size, particularly when disaggregated into urban and rural subgroups. Small sample sizes can lead to reduced statistical power, increasing the likelihood of Type II errors where true effects are not detected. This limitation is particularly pertinent in the context of detecting significant differences between urban and rural participants in terms of sensory impairments. Future studies should aim to increase the sample size, to enhance the robustness of statistical analyses and the generalisability of the findings.

Selection bias

Selection bias is another potential limitation. The participants were drawn from specific urban and rural districts, which may not represent the entire population of 76-year-olds in the Faroe Islands. The voluntary nature of participation could also introduce bias, as those experiencing significant sensory impairments might be more or less likely to participate. Ensuring random sampling and higher participation rates in future studies could mitigate this bias.

The Faroe Islands provide a unique setting for studying sensory impairments among older adults, due to their distinct social structure, small population and geographical isolation. These characteristics create a specific context where access to healthcare services and preventive measures may differ from more urbanised or densely populated areas. By conducting research in this setting, the study can offer insights that are particularly relevant to other isolated or rural communities with similar challenges. This can help inform public health strategies and policy adaptations aimed at improving the quality of life for older adults in such environments, contributing to the generalisability of the findings beyond the Faroe Islands.

Conclusion

Our study supports the necessity of including clinical assessments of hearing and vision in PHVs for older adults. Many older adults are unaware of their sensory impairments, which might have significant consequences for their daily activities, safety and overall quality of life. The discrepancies between self-reported and clinically measured impairments underscore the need for objective testing to accurately identify sensory loss. The results also reveal disparities in healthcare access between urban and rural areas, particularly

regarding specialised services like cataract surgery. To address these disparities and overall improve healthcare outcomes, policymakers should consider mandating regular sensory screenings in PHVs, regardless of the geographical setting. Such measures would support healthier ageing and help maintain the independence of older adults in both urban and rural communities in the Faroe Islands, as well as communities in other parts of the Nordic region.

These revised conclusions should more directly address the aim of the study and provide a stronger argument for integrating sensory assessments into PHVs as part of public health policy.

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Disclosure statement

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

Availability of data and materials

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Authors contribution

GGH and ÁR planned the study. GGH trained the nurses in the Preventive Team and collected the data. GGH prepared the SPSS file and TMK performed the statistical analyses. GGH, ÁR and TMK all contributed to the writing of the article.

Consent for publication

Consent for publication was obtained from all participants.

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