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# Prevalence of speech-language and hearing disorders in elderly and younger adults according to sex and age: a population survey

## *Prevalência de distúrbios fonoaudiológicos em adultos e idosos, segundo sexo e faixa etária: um estudo populacional*

### Keywords

Speech, Language and Hearing Sciences  
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### Descritores

Fonoaudiologia  
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### ABSTRACT

**Purpose:** To verify the distribution of self-reported speech-language and hearing disorders and their association to sex and age in a representative sample of the population in southern Brazil. **Methods:** Prevalence of speech-language and hearing disorders in elderly and younger adults according to sex and age: a population survey based on a household survey on Human Communication Disorders (DCH-POP Study). Standardized home interviews were conducted using a questionnaire with residents of the city of Porto Alegre between 2012 and 2014. The study outcome was self-reported “speech-language and hearing disorders”, constituted from the variables: language, orofacial motricity, hearing, and balance. Analyses of absolute and relative frequencies were performed. Multivariable prevalence ratios were estimated in an adjusted analysis using Poisson Regression with robust variation and 95% confidence intervals. **Results:** Of the 1246 individuals interviewed, 918 participants were eligible for this study. Most of them were female (58.1%), and the average age was 48.9 ( $\pm$  19.6) years. The outcome of speech-language and hearing disorders was found in 364 (39.4%) individuals, and the most affected age group was 60 years old or more (54.4%), with a higher prevalence in men (58.9%) than in women (51.9%). The multivariate analysis showed a significant prevalence ratio only in elderly individuals aged 60 years or older (PR 1.84; 95% CI 1.50-2.26). **Conclusion:** In this study, we did not find significant differences between sexes in the prevalence of self-reported speech-language and hearing disorders in elderly and younger adults. However, elderly and younger adults presented a higher prevalence of these disorders.

### RESUMO

**Objetivo:** Verificar a distribuição dos distúrbios fonoaudiológicos autorreferidos em relação ao sexo e à faixa etária em uma amostra representativa da população do sul do Brasil. **Método:** Estudo transversal em adultos e idosos com base em um inquérito populacional domiciliar autodeclarado sobre Distúrbios da Comunicação Humana (DCH-POP). Foram realizadas entrevistas domiciliares padronizadas com a aplicação de um questionário com residentes da cidade de Porto Alegre entre 2012 e 2014. O desfecho estudado foi “distúrbios fonoaudiológicos”, constituído a partir dos dados das variáveis: linguagem, motricidade orofacial, audição e equilíbrio. Foram realizadas análises de frequência absoluta e relativa. Razões de prevalência multivariáveis foram estimadas em análise ajustada pela Regressão de Poisson com variância robusta e respectivos intervalos de confiança de 95%. **Resultados:** Dos 1246 indivíduos entrevistados, 918 participantes foram elegíveis para este estudo. A maioria é do sexo feminino (58,1%) e a idade média foi de 48,9 ( $\pm$ 19,6) anos. O desfecho distúrbio fonoaudiológico foi encontrado em 364 (39,4%) indivíduos, sendo que a faixa etária mais acometida foi a de 60 anos ou mais (54,4%), apresentando maior prevalência no sexo masculino (58,9%), do que no feminino (51,9%). Na análise multivariável ajustada verifica-se que há razão de prevalência significativa apenas em indivíduos idosos com 60 anos ou mais (RP 1,84 IC95% 1,50-2,26). **Conclusão:** Neste estudo não encontramos diferenças significativas entre os sexos na prevalência dos distúrbios fonoaudiológicos autorreferidos em adultos e idosos. Entretanto, pessoas mais velhas apresentam maior prevalência destes, especialmente aquelas com idade entre 60 anos ou mais.

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## INTRODUCTION

Speech-language disorders have a direct impact on the lives of individuals, interfering in different ways and to varying degrees in their communication, swallowing, hearing, and balance. While studies about these diseases have increased in the last decade, most of them analyze occurrences in a specific segment of the population and deal with isolated changes<sup>(1,2)</sup>.

However, epidemiological surveys can show the distribution of morbidity through self-reported or objective measures. Additionally, these surveys contribute to data collection for the assessment of health services and the behavioral determinants that influence them<sup>(3)</sup>.

It is worth noting that surveys using self-reported measures reflect the participant's perception and interpretation of their own body and health. These secure the indirect participation of the community in the formulation of public policies and are widely used, especially in population-based studies<sup>(4)</sup>.

Given the contemporary concepts of prevention and health promotion, in addition to the distribution of related problems, speech-language and hearing researchers must study the distribution of human communication disorders. These surveys are especially useful for planning and managing actions and health services and are still scarce in our field of knowledge.

Our study aimed to verify the distribution of self-reported speech-language disorders, according to sex and age, in a representative sample of elderly and younger adults from a population in southern Brazil.

## METHODS

This was a cross-sectional study of elderly and younger adults, based on a self-reported household population survey on Human Communication Disorders (DCH-POP). The methodological approach is detailed in the indexed literature<sup>(5)</sup>. Between 2012 and 2014, standardized interviews were conducted with the population living in a specific neighborhood in the city of Porto Alegre. Stratified multistage sampling was achieved through an analysis of age and education distribution. For the sample size of 1500 individuals, a 95% confidence coefficient was used to determine the confidence intervals ( $z = 1.96$ ), with a sampling error of 10%. The portion to be considered from the population subgroups was estimated at 20% ( $P = 0.20$ ). The inclusion criterion in the survey was having a residential address in the selected stratification. For our specific study, we added another inclusion criterion: being 18 years or older.

Once a household was selected, a resident (called a proxy) was asked to fill out the questionnaire after agreeing to participate in the study. All households with members who did not wish to participate in the interview were excluded from the sample, as well as those who we were unable to contact by telephone or after four or five visits to their residence. The total sample of selected residents included 1500 individuals, 1246 of whom were interviewed (16.9% of losses and refusals).

### Study variables

The outcome variable of speech-language/hearing disorder was constituted from data regarding the following variables:

language (i.e. oral language, fluency, written language and voice; questions D2, D6, D7, E4, E6, F1, F6, F10, G1, G3, and G5), orofacial motricity (i.e. chewing and swallowing; questions H5, H7, and H8) and hearing and balance (i.e. tinnitus, hearing loss and/or dizziness; questions I1, I6, and I7). For each question, participants were asked to choose from four possible answers: "yes", "no", "I don't know/no response" and "sometimes". The answer "sometimes" was recoded to "yes" and "I don't know/no response" was recoded to "no".

More information about the questionnaire can be found in the article by Goulart et al.<sup>(6)</sup>. The contextual variables that we analyzed were "sex" (female/male), and "age" (in years), categorized into 18 to 39 years, 40 to 59 years and 60 years and over. The confounding variable "education" (in years) was categorized into 1 to 10 years, 11 to 15 years, and 16 years or more.

### Statistical analysis

Analyses of absolute and relative frequency were performed with a 95% confidence interval (CI) and stratified by sex and age. Poisson Regression was used to adjust analyses of multivariable prevalence ratios (PRs) with robust variance and respective 95% confidence intervals (95% CI). The data were analyzed using SPSS v.21 software (Chicago: SPSS Inc).

### Ethical approval

This study was analyzed and approved by the Research Ethics Committee of the Universidade Feevale, in Novo Hamburgo, Rio Grande do Sul, under protocol number 4.07.01.07.635 and at the Universidade Federal de São Paulo under protocol number 150/10. All participants signed an informed consent form.

## RESULTS

In the DCH-POP study, 1,500 individuals were predicted, and 1246 were interviewed (16.9% of losses and refusals). Of these, 321 were excluded from this analysis because they were under 18 years old. Additionally, there were 7 cases of missing values. Therefore, data from 918 participants were considered. Most of these were female (58.1%) and the mean age was 48.9 (SD  $\pm$  19.6) years.

The outcome of speech-language/hearing disorder was found in 364 (39.4%) individuals. In the adjusted analysis, the most affected age group was 60 years or older, with a higher prevalence in males (58.9%).

The most prevalent speech-language/hearing disorders were hearing and balance (24.6%) issues followed by language disorders (20.2%) and, least frequently, orofacial motricity impairment (4.5%).

The proportion of speech-language/hearing disorders in the sample and their relationship with sex and age are shown in Table 1. No associations were found between these disorders and sex. However, we noted that the disorders were reported more frequently by older individuals (54.4%) than by younger ones (29.9%).

**Table 1.** Prevalence of self-reported speech-language and hearing disorders, stratified by age and sex, in Porto Alegre, RS, between 2012 and 2014

Self-reported speech-language and hearing disorders	Male (n= 385)						Female (n= 533)					
	Age group						Age group					
	18 to 39 years		40 to 59 years		60 years and over		18 to 39 years		40 to 59 years		60 years and over	
	n*** (%)	CI**** (95%)	n (%*)	CI (95%)	n (%*)	CI (95%)	n (%*)	CI (95%)	n (%*)	CI (95%)	n (%*)	CI (95%)
Language	43 (26.5)	(19.9-34.0)	14 (12.6)	(7.1-20.3)	15 (13.4)	(7.7-21.1)	32 (18.3)	(12.9-24.8)	36 (23.7)	(17.2-31.3)	47 (22.5)	(17.0-28.8)
Orofacial motricity	4 (2.5)	(0.7-6.2)	2 (1.8)	(0.2-6.3)	7 (6.2)	(2.5-12.3)	0 (0)	(0-2.1)	5 (3.3)	(1.1-7.5)	24 (11.5)	(7.5-16.6)
Hearing and balance	17 (10.5)	(6.2-16.3)	17 (15.2)	(9.1-23.2)	56 (49.6)	(40.0-59.1)	19 (11)	(6.7-16.6)	36 (23.5)	(17.1-31.1)	83 (39.9)	(33.2-46.9)
Speech-language and hearing disorders in the studied population**	55 (34)	(26.7-41.8)	29 (26.1)	(18.2-35.3)	66 (58.9)	(49.2-68.1)	45 (26)	(19.6-32.9)	61 (40.1)	(32.3-48.4)	108 (51.9)	(44.9-58.9)

\*Adjusted to age and sex; \*\*Variable synthesis: results of one more speech-language and hearing disorder, isolated or associated, constituted by the "language", "orofacial motricity", or "hearing and balance" variables; \*\*\* Absolut frequency; \*\*\*\* Confidence interval

**Table 2.** Unadjusted and adjusted prevalence ratios (PRs) of self-reported speech-language and hearing disorders in Porto Alegre, RS, between 2012 and 2014

Variables	Unadjusted PR (CI 95%)	p-value	Adjusted PR* (CI 95%)	p-value
<b>Sex</b>				
Male	1	-	1	-
Female	1.03 (0.88-1.21)	0.717	0.91 (0.77-1.08)	0.290
<b>Education</b>				
1 to 10 years	1	-	1	-
11 to 15 years	0.81 (0.65-1.01)	0.069	0.86 (0.70-1.07)	0.182
16 or more	0.91 (0.68-1.23)	0.551	1.03 (0.77-1.37)	0.842
<b>Age</b>				
18 to 39 years	1	-	1	-
40 to 59 years	1.14 (0.90-1.44)	0.267	1.11 (0.87-1.44)	0.384
60 years or over	1.82 (1.50-2.21)	<0.001	1.84 (1.50-2.26)	<0.001

Table 2 shows the unadjusted and adjusted analyses of the association between age, sex, education, and speech-language/hearing disorder. We found that there was a higher prevalence ratio among elderly individuals aged 60 years or older (PR 1.84 95%, CI 1.50-2.26) when compared to other age groups.

## DISCUSSION

In this study, we found that the prevalence of self-reported speech-language/hearing disorders in a sample of elderly and younger adult residents in Porto Alegre was 39.4%. The age group of 60 years or over presented the highest prevalence. To date, we have not found another study with a similar methodology regarding residence-based sampling of human communication disorders in elderly and younger adults. There have only been residence-based population studies to verify specific aspects of communication, such as hearing<sup>(6)</sup>.

No significant differences were found between men and women for speech and language disorders, orofacial motricity, or hearing and balance, whether associated and isolated. However, when stratified by age, there was a greater prevalence of speech-language/hearing disorders among participants of both sexes 60 years or older. The most prevalent disorders in this age group were hearing and balance (43.3%), followed by language (19.3%) and orofacial motricity (9.6%) impairment.

Multivariate analysis showed that elderly individuals, or their family members, are the health service users with the highest prevalence of self-reported speech disorders. Furthermore, a study that analyzed access to speech therapy services in southern Brazil found that women and persons with disabilities seek care most frequently<sup>(7)</sup>.

There have been few studies on the prevalence of speech-language/hearing disorders in the adult population. Research carried out in São Paulo<sup>(8)</sup> with individuals from 0 to 92 years old found that about 6.8% complained of language or swallowing problems while 3.6% complained about hearing impairment. The lower prevalence in this study, when compared to ours, maybe due to the difference in the sample age range since the prevalence of these disorders increases with age.

Presbycusis, which is the general term for age-related hearing loss, affected approximately 30% of participants over 65 years in a cohort study carried out in Holland<sup>(9)</sup>. In Beaver Dam (Wisconsin, USA), another study conducted with adult residents between the ages of 48 and 92 years, showed that 45.9% of the participants presented hearing loss. This corroborates our finding that, in the age group of 60 years or more, the prevalence was 43.3%<sup>(10)</sup>. We believe that the higher prevalence of hearing disorders than other speech-language

disorders is related to the fact that the data are self-reported. Hearing disorders, even in their milder forms, maybe more easily perceived because they have a greater impact on social life. This may not necessarily be the case for language and orofacial motricity impairments.

There has been controversy in the literature regarding the higher prevalence of language disorders in males. These findings occur especially in clinical studies<sup>(2)</sup>. However, several of these do not take into account the influence of formal education or more restrictive social conditions when examining this association with language disorders. In addition to sex, environmental and genetic factors such as maternal education and complications during pregnancy may be associated with an increased risk of developing language disorders in childhood<sup>(11,12)</sup>. Thus, concerning the occurrence of speech-language disorders, studies that consider the relationship with the environment and genetics are necessary to allow a more detailed analysis of this difference, especially in adulthood.

The prevalence of dysphagia differs greatly between age groups, with the highest prevalence seen in the elderly. It varies between 1.7% and 11.3% in the general population<sup>(13)</sup>. A study conducted in Paraíba with participants aged 20 to 60 years, shows a 30.5% prevalence of chewing problems. This finding differs from our results, but the inconsistency between research data may be explained by methodological differences, as well as by distinct social and economic issues (e.g. income, access to health services and education)<sup>(14)</sup>.

The prevalence of orofacial motricity disorders can be explained by the aging process, due to the countless changes that occur in the stomatognathic system, such as loss of strength and decreased muscle tone. These interfere with speech, chewing, and swallowing<sup>(1,15)</sup>. Structural changes involve the neurological control of structures and functions, in conjunction with diminished functional sensory and motor capacity. Such modifications may be related to the higher prevalence of speech-language disorders in the older age group.

This is a population-based study, with a representative and relatively large sample. However, there were some limitations. Despite the random multistage sample, women were the main interviewees and constituted the majority of the sample. This was an aspect that was corrected in the adjusted multivariate analysis. Moreover, variations in the measures of results can be expected from a self-report survey. Depending on the type and degree of speech disorder, there is a greater or lesser possibility of the individual perceiving it as a limitation. However, our study aimed to precisely identify speech-language disorders that would require treatment and that implies identifying actual patient discomfort or complaints.

On the other hand, the questionnaire that was used, which was created and validated in a pilot study, was possibly highly sensitive to speech-language disorders. This is because, among other questions<sup>(5)</sup>, it asks if the participant is “having difficulty chewing [or] having difficulty speaking or being understood”, which may have increased the prevalence of these impairments in the studied population.

## CONCLUSION

We did not find significant differences between sexes in the prevalence of self-reported speech-language/hearing disorders in elderly and younger adults. However, older people presented a higher prevalence of these changes, especially those aged 60 years or over. Besides this, the prevalence of these disorders is relatively high, which points to a need for further elaboration of public health care policies.

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#### **Author contributions**

*NAD and BNGG were responsible for the research concept. NAD, BNGG, and RSR drafted the manuscript. NAD, BNGG, RSR and BMC revised the final manuscript.*