

Self-rated health and hearing disorders: study of the Brazilian hearing-impaired population

Autopercepção de saúde em deficientes auditivos adultos no Brasil: inquérito nacional domiciliar

Paula Anderle (<https://orcid.org/0000-0001-6216-5060>)¹

Rafaela Soares Rech (<https://orcid.org/0000-0002-3207-0180>)¹

Alexandre Baumgarten (<https://orcid.org/0000-0002-2528-0489>)¹

Bárbara Niegia Garcia de Goulart (<https://orcid.org/0000-0002-2502-5883>)^{1,2}

Abstract Hearing impairment (HI) is one of the most impacting handicaps related to social life, and 21% have intense limitation compromising daily activities. However, few studies have investigated SRH in HI. This article aims to verify the association between HI and SRH and factors related to hearing characteristics. Cross-sectional study data from National Health Survey (NHS, 2013) conducted with 1,100 hearing impaired adults (≥ 18 years old). The outcome was SHR, categorized as good or poor. Poisson regression with robust variance was used to calculate Prevalence Ratios. Sociodemographic variables and characteristics of HI, such as congenital or acquired HI, type of HI, wear hearing aids, and limitation were used in adjusted analysis. Poor SRH was more prevalent in acquired HI, limitation of daily activities, sociodemographic characteristics such as aging, female, black or other skin color, and lower schooling. Poor SRH is related to acquired HI, limitation of daily activities and socio-demographic conditions.

Key words Hearing Loss, Self-perception of health, Health Surveys

Resumo A deficiência auditiva (DA) é uma das deficiências mais impactantes em relação à vida social, e 21% apresentam limitação intensa, comprometendo as atividades diárias. No entanto, poucos estudos investigaram autopercepção de saúde na DA. O objetivo deste artigo é verificar a associação entre deficiência auditiva e autopercepção de saúde, bem como fatores relacionados às características auditivas. Estudo transversal com dados da Pesquisa Nacional de Saúde (PNS, 2013) realizada com 1.100 adultos (≥ 18 anos) com DA. O desfecho estudado foi a autopercepção da saúde, categorizada em boa ou ruim. As razões de prevalência foram analisadas com regressão de Poisson com variância robusta. Para ajuste foram utilizados dados sociodemográficos e características da perda auditiva, como deficiência congênita ou adquirida, tipo de DA, uso de aparelhos auditivos e da limitação das atividades diárias. A maior prevalência de autopercepção de saúde ruim foi associada à surdez adquirida, à limitação das atividades diárias, bem como características sociodemográficas como envelhecimento, sexo feminino, cor de pele preta ou outra e menor nível escolar. A autoavaliação de saúde ruim está relacionada à perda auditiva adquirida, à limitação das atividades diárias e a características sociodemográficas.

Palavras-chave Perda Auditiva, Autopercepção de saúde, Inquéritos Epidemiológicos

¹ Programa de Pós-Graduação em Epidemiologia, Faculdade de Medicina, Universidade Federal do Rio Grande do Sul (UFRGS). R. Ramiro Barcelos 2400, Santa Cecília. 90035-004 Porto Alegre RS Brasil.

bngoulart@gmail.com

² Departamento de Saúde e Comunicação Humana, Instituto de Psicologia, UFRGS. Porto Alegre RS Brasil.

Introduction

Hearing impairment (HI), or hearing loss, is a common health disorder. Data provided by the World Health Organization (WHO) indicate that 1.1 billion people in the world will develop hearing loss¹. In Brazil, 1.1% of all population has HI, 0.9% of those became deaf as a result of some disease or accident and 0.2% were born deaf. Even, the prevalence of HI tended to increase with aging and among individuals referring to be white skinned^{2,3}.

HI in adults is associated with cognitive decline, depression and reduced functional status, especially for those who have hearing loss, and were not evaluated or treated. This disability were considered one of the most impacting in relation to the social life^{4,5}. A population-based survey conducted in Belgium pointed a poor subjective perception of health, mental health and social well-being in individuals with HI, concluding that greater attention is needed in public health policies, including strategies for prevention, identification and timely treatment⁶. In Brazil, a study conducted with 228 individuals assessed the association between self-perception of health, perception of hearing problems and motivation to seek hearing health care service, concluded that considering hearing impairment a health problem was associated with a higher odd of poor self-rated health⁷.

Self-rated health (SRH) is a subjective low-cost tool that depends on personal, cultural and socioeconomic aspects and it is used to measure the real health status of individuals, once is an important predictor for morbidity, mortality, health services utilization and health status of populations⁸⁻¹⁰. SRH is widely studied around the world and there are many studies with different population. However, few studies have investigated SRH in hearing impairment⁷.

Considering that among the total of hearing impaired individuals, 21% have an intense or a very intense degree of limitation, which compromises common daily activities², and that untreated hearing loss has been associated with decreased general quality of life and self-rated health (SRH)^{4,11}, it is important to assess SRH in individuals with HI, once surveys on SRH specified information for the construction of health indicators¹².

Our hypothesis is that hearing loss is related to poorer self-rated health and that factors associated with hearing loss, such as origin, limitation and use of rehabilitation services can influence

the self-rated health of individuals. Thus, the identification of health perception of individuals with congenital or acquired hearing loss, their social conditions and associated factors related to the disability are extremely important to develop promotion and prevention actions on public health, as well as implementation of new treatments and policies that contemplate this population. In this scenario, this study aims to verify the association between hearing impairment and SRH in Brazilians adults, as well as factors related to hearing characteristics, such as congenital or acquired hearing loss, type of hearing impairment, wearing hearing aids, and limitation of daily activities.

Method

Study design and data source

A cross-sectional study based on open data from the National Health Survey (NHS) conducted in Brazil in 2013. The NHS is a home-based survey, part of the Home Research System, conducted every five years by the Ministry of Health in partnership with two research institutions: Brazilian Institute of Geography and Statistics and Oswaldo Cruz Institute Foundation (Fiocruz). The NHS was structured in 20 modules, and investigate sociodemographic characteristics, health status, utilization of health services, and lifestyle. The study was approved by National Research Ethics Commission (CONEP).

Sampling

The NHS was performed in a multiple stage cluster sampling: census tracts (health units), households and adult inhabitants (18 years or older) selected for information on the individual questionnaire^{13,14}. The sample size of the NHS was calculated in base of the following aspects: estimation of proportions with the desired level of precision with 95% confidence intervals; effect of the sampling plan, once it was a multiple stage conglomeration sampling; number of households selected in which census tracts; proportion of households with people in the age group of interest. The sample size was calculated to be 79,875 households. Mean values, variances and sample design effects were taken into consideration in the calculation, predicting a non-response rate of 20%. Losses were considered: closed or empty domicile; refusal of the res-

idents; not be able to interview the resident after three or more attempts, even with a schedule of visits. A total of 64,348 households were selected, but 60,202 interviews were conducted. Once NHS has a complex sampling design the final weight of the selected resident was calculated.

Participants

To the study population, the inclusion criteria were individuals aged 18 years or over, respondents from the individual questionnaire of NHS, who answered positively to the question G14 (“Do you have hearing loss?”), in modulo G: disable person. The final sample consisted in 1,100 individuals.

Self-rated health

The outcome was the self-rated health, was obtained in a self-reported way, and was categorized posteriorly in good (very good, good) and poor (fair, poor, very poor). For the multivariate analysis, the poor category was considered as reference for data adjustment and interpretation.

Exposure factor

The exposure factor considered was hearing loss. This variable was collected through self-report from those who responded positively “Do you have hearing loss?”. To evaluate characteristics related to hearing impairment, the following variables were used: congenital or acquired hearing impairment, type of hearing loss (deafness in both ears; deafness in one ear and hearing reduced/normal in the other, and hearing reduced in at less one ear), limitation of daily activities (yes and no), use of rehabilitation service (yes and no), and wearing hearing aids (yes and no). It is important to highlight that type and degree of hearing loss was not specifically measured for this study. These variables were self-reported by the individual based on previous examinations.

Adjustment variables

For adjusting, the following sociodemographic variables were used: sex (female and male), age (categorized in 18-39 years, 40-59 years and 60 years or more), skin color (categorized in white, black and other (brown, indigenous)); living together (yes and no); and education level (categorized in until elementary school and high school or more). In education level, 233

participants did not answer this section and were considered as missing in the system. Thus, characteristics of hearing loss and limitation of daily activities were included in the adjusted analysis.

Data analysis

Data were analyzed by the software R with *Survey* and *Sandwich* packs¹⁵. Once NHS has a complex sampling design and unequal selection probabilities, the final weight of the selected resident was calculated as the product of the weight of the household and the number of eligible residents in the household. Absolute and relative frequency analyzes were calculated. The Pearson chi-squared Test was used to assess differences between the studied variables with a significance level of 0.05%. Poisson Regressions with robust variance were used to calculate the crude and adjusted Prevalence Ratios (PR) and their respective confidence intervals of 95%.

Results

The interviews were conducted in 64,348 households, 60,202 subjects responded the questionnaire, which 1,100 presented HI. From this 568 (51.6%) were female. The mean age of the total sample was 61.21 years (SD 16.84), and 638 (58%) individuals were 60 years of age or more. The majority were white (47.8%, n=526), not married or living together (55.0%, n=605) and has elementary school as a minimum level of education (53.3%, n=587). Furthermore 91.7% (n=1,009) presented an acquired hearing impairment and 86.5% (n=952) do not wear hearing aid.

Tables 1 and 2 shows, respectively, sociodemographic data and characteristics about hearing loss associated with SRH. The following variables were significantly ($p < 0.05$) associated with SRH: age ($p < 0.001$), skin color ($p = 0.006$), education level ($p < 0.001$), congenital or acquired hearing impairment ($p = 0.001$) and limitation of daily activities as result of the impairment ($p < 0.001$).

The multivariate model is presented in Table 3. SRH is related to female (PR=1.10 CI95% 1.02-1.29), aging (40-59 years PR=2.25 CI95% 1.87-2.71; and 60 years or more PR=2.49 CI95% 2.09-2.69), skin color (black and other PR=1.19 CI95% 1.11-1.29), lower education level (PR=2.01 CI95% 1.72-2.36), acquired hearing loss (PR=1.38 CI95% 1.18-1.61), do not wear hearing aid (PR=1.125 CI95% 1.06-1.47) and

Table 1. Sociodemographic data of hearing impaired adults who answered the National Health Survey in relation to self-rated health (Brazil, 2013).

Variable	Total	Self-rated Health		p-value*
	n (%)	Good n (%)	Poor n (%)	
Sex				0.209
Male	532 (48.4)	215 (42.1)	317 (57.9)	
Female	586 (51.6)	193 (36.3)	375 (63.7)	
Age (years)				<0.001
18-39	133 (11.2)	85 (73.0)	48 (27.0)	
40-59	329 (31.8)	126 (39.1)	203 (60.9)	
60 or more	638 (57.0)	197 (32.7)	441 (67.3)	
Color/race				0.006
White	526 (48.0)	217 (44.5)	309 (55.5)	
Black and Other	572 (52.0)	191 (33.5)	382 (66.5)	
Living together				0.253
Yes	495 (41.2)	184 (40.2)	311 (59.8)	
No	605 (58.8)	224 (35.1)	381 (64.9)	
Education level				<0.001
Until elementary school	587 (68.6)	173 (30.7)	414 (69.3)	
High school or more	280 (31.4)	167 (65.7)	113 (34.3)	

*Pearson qui-square.

Source: Data from National Health Survey, Brazil, 2013.

Table 2. Characteristics related to hearing impairment, use of rehabilitation services and limitation of daily activities in relation to self-rated health (Brazil, 2013).

Variable	Total	Self-rated Health		p-value*
	n (%)	Good n (%)	Poor n (%)	
Hearing impairment				<0.001
Congenital	91 (7.7)	49 (55.1)	42 (44.9)	
Acquired	1,009 (92.3)	359 (38.0)	650 (62.0)	
Use of rehabilitation service				0.263
Yes	57 (7.2)	17 (40.0)	40 (60.0)	
No	1,043 (92.8)	391 (39.3)	652 (60.7)	
Wear hearing aid				0.201
Yes	148 (14.4)	62 (50.1)	86 (49.9)	
No	952 (85.6)	346 (37.5)	606 (62.5)	
Limitation of daily activities				<0.001
Does not limit	414 (38.2)	198 (47.0)	216 (53.0)	
Moderately/Strongly limits	686 (61.8)	210 (34.4)	476 (65.6)	
Type of hearing impairment				0.944
Deafness in both ears	64 (5.2)	25 (46.3)	39 (53.7)	
Deafness in one ear and reduced/ normal in the other	267 (27.2)	99 (40.9)	168 (59.1)	
Hearing reduced in at less one ear	733 (67.6)	284 (38.0)	485 (62.0)	

*Pearson Qui-square

Source: Data from National Health Survey, Brazil, 2013.

limitation of daily activities (PR=1.23 CI95% 1.13-1.34). In adjusted model, wearing hearing aid was not associated with the outcome. Poor self-rated health was not related to the type of hearing impairment.

Discussion

The results estimated that poor SRH is prevalent in those who have acquired hearing impairment and have limitation of daily activities. In addition, poor SRH is prevalent in sociodemographic characteristics such as aging, female sex, black or other skin color and education level until elementary school.

Self-rated health (SRH) is widely used around the world as an important indicator of mortality, morbidity and health utilization⁸⁻¹⁰, and represents a two-fold higher risk of all-cause mortality in individuals reporting poorer SRH than those reporting excellent SRH¹⁶. To verify SRH in hearing impaired adults is an important tool to assess health, planning interventions and identifying disparities, because encompasses aspects of physical, cognitive and emotional health; furthermore, it is associated with the real state of health, having room to be regarded as a reliable representation of the subjective assessments of health^{4,17}. Measuring health status allows defining levels of comparison of socioeconomic characteristics, health risk factors, quality of life and mortality among population groups^{9,18}.

Studies indicate that hearing loss is related to mental health once when untreated it has been associated with a decrease in quality of life related to health perception^{4,19,20}. Also, individuals who consider hearing loss a health problem presented odds four times greater of reporting poor SRH in relation to the peers who did not consider the hearing loss as a health problem⁷. Understanding the impact of hearing impairment on SRH becomes important both for health professionals and health managers, and for researchers in the area²¹. Identifying people with poor SRH through surveys helps in the process of developing strategic plans and interventions for this population, avoiding more serious consequences²².

In this study, 58% of participants were 60 years or more, and poor SRH were more prevalent in this population (PR=2.17 CI95% 1.70-2.76). Aging is associated with presbycusis which, in turn, is related to social isolation, depression and, consequently, poor SRH. Although wearing hearing aids may reduce the effects of acquired

hearing loss, Brazilian studies indicate that the process of adaptation of hearing aids is more difficult for the elderly^{23,24}. This fact corroborates with ours results, in which 86.5% of the participants do not wear hearing aid. After adjustment, wearing hearing aid was not associated with poor SRH, however, it is important to reflect on the influence of untreated hearing loss on health perception^{19,20}. Studies pointed that most hearing impaired patients can be successfully rehabilitated wearing appropriate hearing aids^{22,25}.

Although the results estimate no association between type of hearing impairment and poor SRH, the limitation of daily activities related to hearing loss and the nature of hearing impairment (congenital or acquired) was significantly associated with the outcome. The condition of limitation is relevant once it directly influences the social participation of the individual. Studies indicated that individuals with acquired hearing loss are more likely to increase anxiety, depression and social isolation, when compared with individuals with congenital hearing impairment. Also, people with congenital hearing impaired or with hearing loss in the first years of life have more self-acceptance of hearing loss, serving as the basis for the willingness to deal with the limitations associated with deafness²⁶⁻²⁸. Fact that might be considered in the perception of health status.

The International Classification of Functioning, Disability and Health (ICF) establishes that activity limitation is assessed according to an accepted population standard and may lead to a mild to severe deviation, leading to negative aspects regarding the quality of daily activities. Reporting further that the use of devices may reduce limitation and assist in the functionality of individuals with disabilities²⁹. In this study, data on limitation were obtained self-reportedly, and the participant reports how much hearing loss limits its functionality in daily activities. Our findings were that limitation caused by hearing impairment was positively associated with poorer SRH. In addition, most participants who do not use hearing aids (62.5%) reported poor SRH. We believe that the restriction of social participation caused by hearing impairment, and the absence of hearing aids, may contribute to the level of limitation and, consequently, to the worse perception of health.

In relation to socioeconomic aspects, authors have presented that the hearing impaired population are more likely to increase unemployment, disability retirement (11% of men and 16% of

Table 3. Crude and adjusted prevalence ratio (PR) for sociodemographic data, characteristics of hearing impairment and limitation of daily activities in relation to self-rated health (Brazil, 2013).

Variable	Crude PR (95% CI)	p-value	Adjusted PR* (95% CI)	p-value
Sex				
Male	1	-	1	-
Female	1.10 (1.02-1.18)	0.007	1.14 (1.03-1.26)	0.007
Skin color				
White	1	-	1	-
Black and other	1.19 (1.11-1.29)	<0.001	1.07 (0.98-1.16)	0.102
Education level				
High school or more	1	-	1	-
Until elementary school	2.01 (1.72-2.36)	<0.001	1.85 (1.57-2.19)	<0.001
Hearing impairment				
Congenital	1	-	1	-
Acquired	1.38 (1.18-1.61)	<0.001	1.68 (1.33-2.14)	<0.001
Wear hearing aid				
Yes	1	-	1	-
No	1.25 (1.06-1.47)	0.006	1.23 (0.92-1.62)	0.146
Limitation of daily activities				
No limitation	1	-	1	-
Limitation	1.23 (1.13-1.34)	<0.001	1.15 (1.06-1.26)	<0.001
Type of hearing impairment				
Deafness in both ears	1	-	1	-
Deafness in one ear and reduced/normal in the other	1.09 (0.95-1.26)	0.193	1.01 (0.92-1.10)	0.814
Hearing reduced in at less one ear	1.15 (1.02-1.29)	0.016	0.93 (0.84-1.04)	0.220

95%CI: Confidence Interval of 95%; PR: Prevalence Ratio. *Adjusted for: sex, color/race, education level, hearing impairment, wear hearing aid, limitation of daily activities and type of hearing impairment.

Source: Data from National Health Survey, Brazil, 2013.

women) and sick leave in relation to the general population³⁰. Also, hearing loss is associated with lower education level and, consequently, lower family income^{10,31,32}. A survey conducted in Spain estimate that people with hearing impairment are 10.2% more likely to have only elementary education³³. In Brazil, people who have more years of study have better socioeconomic conditions and more access to health³⁴, which might influence perception of health. In this study, 53.3% of the participants studied until elementary school and the participants with higher school level presented a lower prevalence of poor SRH.

Another important aspect that must be highlighted is the disparities in health and discrimination. Our findings showed that female sex, aging, and have black or other colors of skin were positively associated with poor SRH. Discrimination is defined as the unfair treatment of groups of individuals based on socially marginalized aspects of their identity, such as race, ethnicity, culture, gender, or ability³⁵. The hypothesis is that dis-

crimination leads to health disparities that, in turns, have influence in SRH.

A study conducted in Canada concluded that perception of discrimination based on physical appearance and disability have an adverse impact on health³⁶. Another study conducted with black skin people in USA presented that the participants reported greater lifetime discrimination, which was associated with higher neuroticism and lower agreeableness, both of which were associated with poor physical and mental health. The authors concluded that the color of the skin exerts an indirect effect on SRH via discrimination³⁵. Our results intended to highlight the importance of new actions and policies against discrimination to improve SRH in these groups.

This study presenting a very relevant proposal and have a nationally representative sample; however, some limitations need to be considered. Data collection was self-reported and may lead to information bias, the information about hearing impairment and type of hearing loss

were based on previously examination. The data collected do not allow us to identify details about demand for rehabilitation and inclusion of the hearing impaired. In this scenario, other studies with another approach and new surveys that detail the demands for specific actions in order to improve the self-rated health in this population are relevant.

Conclusion

In hearing impaired adults, poor SRH is related to acquired hearing loss, limitation of daily activities and sociodemographic conditions, such

as sex, aging, skin color and education level; evidencing that this population requires specific actions. The results evidencing that this part of the population requires actions directed towards the demands related to sensory impairment and its limitations, both in relation to social aspects, as well as to education and health.

The measure of self-rated health of hearing-impaired people can be valuable in the process of creating public policies for education and assistance aimed at inclusion and social participation, as it identifies social and health services disparities. Thus, new studies on the self-rated health of this population that verify the necessary demands are encouraged.

Collaborations

P Anderle contributed to the conception and design of the study, analysis and interpretation of data, writing of the article, review and final approval of the content. RS Rech contributed to the conception and design of the study, analysis and interpretation of data, writing of the article, review and final approval of the content. A Baumgarten contributed to the conception and design of the study, analysis and interpretation of data, writing of the article, review and final approval of the content. BNG Goulart contributed to the conception and design of the study, analysis and interpretation of data, writing of the article, review and final approval of the content.

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