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# Life expectancy with hearing loss: estimates for Brazil

## Expectativa de vida com perda auditiva: estimativas para o Brasil

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## ABSTRACT

**Purpose:** to analyze the prevalence of self-reported hearing loss in relation to age, gender and regions of Brazil and to estimate life expectancy with hearing loss in Brazil, at birth and at age 60, for both sexes. **Methods:** the Sullivan method was used, combining the life table and the prevalence of hearing loss in the period, as well as the adoption of data from the 2013 National Health Survey and Complete Life Tables, by sex, published by the Brazilian Institute of Geography and Statistics. **Results:** in Brazil, in 2013, the prevalence of hearing loss gradually increased from the age of 60, in both genders, with males being more affected by hearing loss. Life expectancy at birth was 71.2 years for men and 78.5 years for women. Of these years of life, 3.4% (for men) and 2.8% (for women) were with hearing loss. At age 60, this difference remains, with an expectation of another 19.9 years for men and 21.7 years for women. In this age group, men had a rate of 2.2 years (11.3%) with hearing loss, while for women the rate was 2.1 years (9.7%). **Conclusion:** in Brazil, based on data from 2013, there was a gradual increase in the prevalence of hearing loss from the age of 60 for both genders. Women had higher life expectancy, greater life expectancy free of hearing loss and live a smaller portion of their lives with hearing loss than men, regardless of age. The assessment of life expectancy with hearing loss at birth and at age 60 can help to understand the needs of the population, which allows for better planning of public policies related to the hearing health of individuals.

**Keywords:** Life expectancy; Hearing; Hearing loss; Hearing disorders; Quality-adjusted life expectancy

## RESUMO

**Objetivo:** analisar a prevalência da perda auditiva autorreferida em relação à idade, sexo e regiões do Brasil e estimar a expectativa de vida com perda auditiva no Brasil, ao nascer e aos 60 anos, em ambos os sexos. **Métodos:** foi utilizado o Método de Sullivan, combinando a tábua de vida e as prevalências de perdas auditivas no período, assim como a adoção de dados da Pesquisa Nacional de Saúde de 2013 e Tábuas de Vida Completas, por sexo, publicadas pelo Instituto Brasileiro de Geografia e Estatística. **Resultados:** no Brasil, em 2013, a prevalência da perda auditiva aumentou gradativamente a partir dos 60 anos de idade, em ambos os sexos, sendo o masculino o mais afetado pela deficiência auditiva. A expectativa de vida ao nascer era de 71 anos e 2 meses para os homens e de 78 anos e 6 meses para as mulheres. Destes anos de vida, 3,4% (para homens) e 2,8% (para mulheres) eram com perda auditiva. Já aos 60 anos, essa diferença permanece, com expectativa de mais 19,9 anos para os homens e 21,7 anos para as mulheres. Nessa faixa etária, os homens apresentavam taxa de 2,2 anos (11,3%) com perdas auditivas, enquanto, para as mulheres, a taxa era 2,1 anos (9,7%). **Conclusão:** no Brasil, com base nos dados de 2013, observou-se um aumento gradativo da prevalência de perda auditiva a partir dos 60 anos de idade para ambos os sexos. As mulheres apresentam maior expectativa de vida, maior expectativa de vida livre de perdas auditivas e vivem menor parcela de suas vidas com perdas auditivas, quando comparadas aos homens, independentemente da idade. A avaliação da expectativa de vida com perdas auditivas ao nascer e aos 60 anos pode auxiliar na compreensão das necessidades da população, o que permite o melhor planejamento de políticas públicas relacionadas à saúde auditiva dos indivíduos.

**Palavras-chave:** Expectativa de vida; Audição; Perda auditiva; Transtornos da audição; Expectativa de vida ajustada à qualidade de vida

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## INTRODUCTION

Brazil has been undergoing since the mid-20th century a unique process regarding fertility and mortality levels, consequently increasing life expectancy. This change in the population age structure is mainly due to greater access to potable water and basic sanitation and increased literacy indices in all ages. This phenomenon brought about changes worldwide, as public policies must adapt to ensure healthy aging and avoid significant occurrences of senility in the world population[1]. According to the Brazilian Institute of Geography and Statistics (IBGE), in 2019 Brazil reached a mean overall life expectancy of 76 years and 6 months – more specifically, 80.1 years for women and 73.1 years for men[2]. This means a sharp increase in the proportion of older adults in Brazil, which is also a worldwide tendency. However, attention must be paid to significant changes in the country's health structure and system because increased life expectancy is not a synonym for healthy aging and the absence of diseases. Various conditions can affect the population's quality of life, including hearing loss (HL)[3].

HL is the difference between one's performance and the normal ability to detect sound, based on standards established by the American National Standards Institute[3,4]. This condition prevails among older people and those with diabetes mellitus, arterial hypertension, and chronic kidney diseases[5].

In 2018, the World Health Organization (WHO) estimated an incidence of 360 million people with some degree of HL in the world[6]. As for Brazil, IBGE data identified that 1.1% of the country's population had HL in 2013 – of which the smallest proportion was in the North Region (0.8%)[7]. HL was more frequent in people without education or that did not finish middle school (1.8%) and among those 60 or more years old (5.2%)[7].

Various factors can cause HL, among which the following stand out: genetic factors, intrauterine infections, perinatal asphyxia, hyperbilirubinemia, extremely low birth weight, infectious disease (especially meningitis), chronic disease, ototoxic drug use, nutritional deficiency, and traumas[6,8]. Regardless of its cause, HL has a great impact on the quality of life, as hearing interferes with speech, language, and consequently, interpersonal communication and various other everyday learning activities[5,8]. When HL occurs before 3 years old, there is a great loss in oral language acquisition, which is the most used means of social and family communication[6].

Hence, HL is one of the most incapacitating disabilities regarding the person's relationship with society[8]. This has psychological consequences, as HL in adults can be associated with depression, cognitive decline, and reduced functional capacity[9-11]. The same tendency is observed in older people with HL, as social isolation, depression, and accelerated cognitive decline are common in such cases[9,11]. Moreover, individuals with HL may have some degree of dependence, with difficulties going to public places or talking over the phone without help[11]. Difficulties related to communication, lack of independence at work, and even insufficient public policies for inclusion are among the factors that discourage people with HL[10].

Advancements in hearing healthcare public policies and the implementation of Specialized Attention Services for People with HL are extremely important and have a direct impact on healthy life expectancy. The Brazilian Ministry of Health instituted the National Hearing Healthcare Policy in 2004 to improve hearing health actions in the Unified Health System (SUS). Thus, it proposed the organization of a hierarchical, regional, and integrated network encompassing primary, medium- and high-complexity healthcare to ensure auditory diagnosis and rehabilitation and speech-language-hearing therapy to adults and children[12]. This policy enabled specific actions in primary, medium- and high-complexity healthcare, organized and implemented by each state's Department of Health. Furthermore, minimum technical functioning criteria were established for the services and the reorganization and classification of SUS procedures[12].

Given the above, it is greatly important to approach this topic, as HL may cause great loss to such people in various aspects, particularly emotional, communication, cognitive, social, and professional ones. This study aimed to analyze the prevalence of self-reported HL regarding age, sex, and regions of Brazil and estimate the life expectancy with HL, based on 2013 National Health Survey (NHS) data[13].

## METHODS

This retrospective study used 2013 NHS data[13] and 2013 Complete Life Tables per sex[14]. Data collected from NHS are directly related to individuals, with information such as diseases diagnosed by health professionals, access to certain health services, and household data. Such data outline the Brazilian population's health condition through a representative sample. Since the research used public domain information, it was exempted from submission to and approval of the institution's Research Ethics Committee, as provided by Law no. 12.,527, of November 18, 2011. Therefore, the study was also exempted from having an informed consent form. The sample number had 60,202 households, totaling 205,546 people interviewed, making it possible to construct indicators of Brazil's federative units, capitals, and metropolitan areas[15].

This study analyzed the answers to questions G14 to G18 in the 2013 NHS (Chart 1), addressing the prevalence of HL per sex and age in Brazil and its regions. Concerning inclusion criteria, individuals were classified as having hearing problems when they answered affirmatively to question G14: "Do you have HL?". Among these, only the ones who had acquired the disability during their lives were used in this study, based on the answers to question G15: "Were you born with HL, or have you acquired it?". Hence, participants who answered that they were born with HL were excluded from the study.

All questions on HL selected for analysis were answered by people 18 or more years old. They were responsible for their household and answered for the other ones who lived there, including children and adolescents. Disabilities were investigated for children of all ages. If the respondent did not know or would not answer any question, it was checked as "not known/not answered". As previously reported, individuals who answered affirmatively to question G14: "Do you have HL?" were classified as having HL. It must be highlighted that the 2013 NHS did not have missing data on questions related to HL. Another important observation is that the method does

**Chart 1.** Questions on hearing loss taken from the 2013 Brazilian National Health Survey

| **We will now approach permanent hearing loss, that is, partial or total loss of the possibility of hearing.** | | | |
|---|---|---|---|
| G14. Does _____ have hearing loss? | G15. Was _____ born with hearing loss or was the impairment acquired later? | G16. What hearing impairment? | |
| () 1. Yes | () 1. Was born with the disability | () 1. Deaf in both ears | () 4. Limited hearing in both ears |
| () 2. No | () 2. It was acquired. At what age? _____ | () 2. Deaf in one ear and limited hearing in the other | () 5. Limited hearing in one ear |
| (If G14 = 2, continue to G21) | (Continue to G16) | () 3. Deaf in one ear and normal hearing in the other | |
| | | (Continue to G17) | |
| G17. In general, to what degree does hearing loss limit _____'s habitual activities? | | G18. Does _____ attend any rehabilitation service due to hearing loss? | |
| () 1. It does not limit | () 4. Intensely | () 1. Yes | () 2. No |
| () 2. A little | () 5. Very intensely | | |
| () 3. Moderately | | | |
| (Continue to G18) | | (Continue to G21) | |

not allow verification of changes in the person's health status, as it used cross-sectional rather than longitudinal data. Hence, the individuals' health status may have improved or worsened, as in treatable hearing loss. This situation is a limitation of this study. However, it must be considered that the prevalence of hearing loss in children and young people is very small in comparison with that of older adults. Given the small sample size, if a child or young person recovered from hearing loss, it would have little influence on the estimates. NHS data analysis aims to draw near to reality, and Sullivan's method[16] is widely used to estimate healthy life expectancy – despite the limitations of NHS data.

The sample comprised people of all ages, from 0 to 112 years, distributed into 5-year groups. Cases whose ages were not declared were excluded. Prevalence was calculated using the weights provided by the database, employing techniques that considered the complex NHS sampling to ensure it represented the whole population. Life expectancy with HL was estimated with Sullivan's method[16], combining the 2013 life table[14] with the prevalence of HL in the population in the same period. Sullivan's method is the main technique used to estimate healthy life expectancy[17]. The main advantage of this method is that it only needs cross-sectional data. Hence, it can be used in this study because it has periodical data on the topic of interest – i.e., data from one specific point in time (2013). This method is an essential tool to furnish the means to debate whether populations are living longer, healthier lives, or only longer but not healthier ones.

Life expectancy with HL ($LEWHL_x$) is defined as follows:

$$LEWHL_x = \frac{\sum(n\pi x)nLx}{lx} \quad (1)$$

In which:
$LEWHL_x$: Life expectancy with HL is the mean number of years that will be lived with HL after age x;
$n\pi x$: proportion of people with HL aged x to x+n;
$nLx$: people-years lived from x to x+n, corresponding to the total years lived by the cohort in the period;
$lx$ : odds of surviving until age x.

Thus, the method combines mortality data – i.e., $lx$ and $nLx$ from the survival tables available from IBGE – with hearing loss prevalence data in the same year $n\pi x$, health data. This procedure is quite similar to the one used to construct the traditional life expectancy at birth – its difference is the weight using people-years lived by the prevalence in question. This weight leads to the total people-years lived with HL. Then, it is divided by the odds of surviving until age x. The result is a synthesis indicator of the hearing health status, combining mortality and morbidity.

Separate survival tables were constructed per sex. The expectancy of years lived in each age on the table was estimated according to the prevalence of HL in each specific age group. The results used the estimates at birth and 60 years old in each region of Brazil.

## RESULTS

The distribution of answers to 2013 NHS questions G14 to G18 is shown in Table 1 and Figures 1-2. In 2013, 2.34% of interviewees reported having acquired HL during their lifetime. The most recurrent manifestation was reduced hearing in both ears. Also, 94.16% of participants with acquired HL did not attend any rehabilitation service.

HL affected 2.34% of Brazilian inhabitants in 2013. When analyzed per sex in all regions of the country, the prevalence was greater among males in both age groups, except for the Northeast, where females with HL at birth predominated (3.7%) (Figures 1-2). In the North and Central-West, men at birth could expect to live an average of 68.2 years and 71.2 years, respectively, of which 2.5 years (3.7%) and 3 years (4.2%) with hearing problems. As for 60-year-old men, they would live respectively 2.4 and 3.2 years of the remaining 18.7 years and 19.8 years with hearing problems (12.7% and 16.1%).

These values among women at birth reached 75.3 years in the North and 77.9 years in the Central-West, of which 1.5 years (2%) and 1.7 years (2.2%) would be lived with HL. Women 60 years old could expect to live on average another 21.6 years and 22.8 years, of which 1.4 (North) and 1.5 (Central-West) would be lived with HL (respectively 6.4% and 6.8%).

In the South and Southeast, men's life expectancy at birth was of 73.5 and 73.3 years, respectively. Of these, 3.6 years (4.9%) and 2.2 years (3%) would be with HL. Men 60 years old in both regions could expect to live another 20.4 years, of which 2.8 years (14%) and 2 years (9.6%) would be with HL, respectively in the South and Southeast.

**Table 1.** Distribution of answers to questions G14 to G18 in the 2013 Brazilian National Health Survey

| Questions | % | 95% CI |
|---|---|---|
| **G14. Hearing loss** | | |
| Yes | 2.56 | (2.35-2.80) |
| No | 97.44 | (97.20-97.65) |
| **G.15 Acquired hearing loss** | | |
| Yes | 2.34 | (2.14-2.56) |
| No | 97.66 | (97.44-97.86) |
| **G 16. Type of acquired hearing loss** | | |
| Deaf in both ears | 6.35 | (4.63-8.64) |
| Deaf in one ear and limited hearing in the other one | 9.48 | (7.09-12.57) |
| Deaf in one ear and normal hearing in the other one | 12.33 | (12.33-18.80) |
| Limited hearing in both ears | 32.59 | (32.59-41.09) |
| Limited hearing in one ear | 28.29 | (28.29-36.25) |
| **G17. Limitations in habitual activities due to the disability** | | |
| No limitations | 36.63 | (32.67-40.77) |
| A little | 32.23 | (28.16-36.58) |
| Moderately | 19.15 | (16.05-22.70) |
| Intensely | 9.26 | (6.76-12.55) |
| Very intensely | 2.74 | (1.69-4.42) |
| **G18. Rehabilitation service due to hearing loss** | | |
| Yes | 5.84 | (3.89-8.70) |
| No | 94.16 | (9.13-96.11) |

**Source of basic data:** National Health Survey[13]
**Subtitle:** % = Percentage; CI = Confidence interval

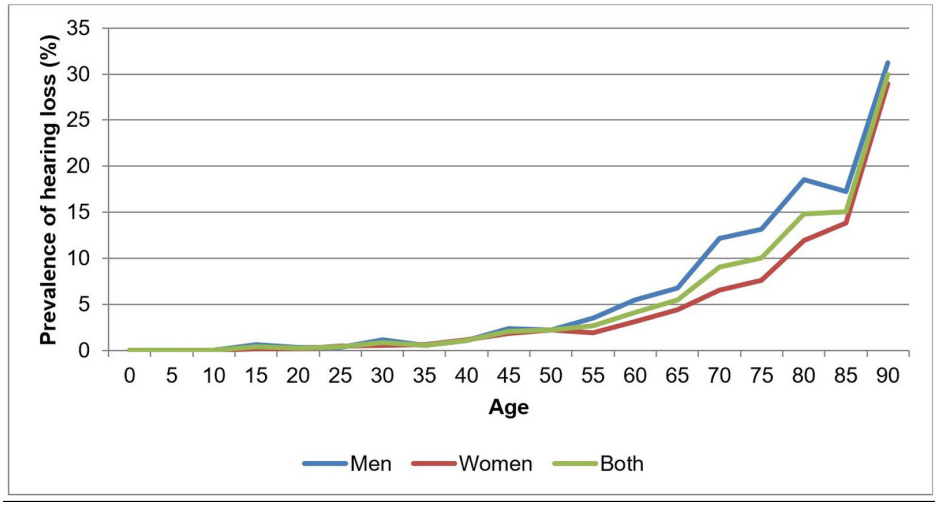


**Figure 1.** Prevalence of hearing loss per age and sex, Brazil, 2013
**Source:** National Health Survey[13]
**Subtitle:** % = Percentage

Women's life expectancy at birth was 80.3 years in the South and 79.8 years in the Southeast, of which 3.5 years (4.4%) and 2.2 years (2.6%) would be with HL.

In the Northeast, men at birth could expect to live 68.1 years, of which 1.8 years with hearing problems (2.7%). Among women these values were 76.4 years and 2.8 years (3.7%), surpassing the male rates. Women 60 years old in the Northeast could expect to live another 22.4 years, while men had an expectancy of 18.9 years. Women would live 1.7 of these years (7.5%) with HL, and men, 1.9 years (10.2%).

Table 2 presents estimates of total life expectancy (Ex), life expectancy free from HL (LEFHLx), and life expectancy with HL (LEWHLx) in 2013, in men and women both at birth and 60 years old, in absolute and relative terms in all regions of Brazil.

Regardless of age, women have greater life expectancy, greater LEFHL, and lived a smaller part of their lives with HL. Contrarily, men had shorter life expectancy, shorter life expectancy free from HL, and lived a longer part of their lives with HL. The life expectancy at birth in Brazil in general was 71.2 years for men and 78.5 years for women; of these, 3.4% (men) and 2.8% (women) would be with HL. At 60 years old, the difference remains, with an expectancy of another 19.9 years for men and 21.7 years for women. Men would live 2.2 years (11.3%) with HL, and women, 2.1 years (9.7%).

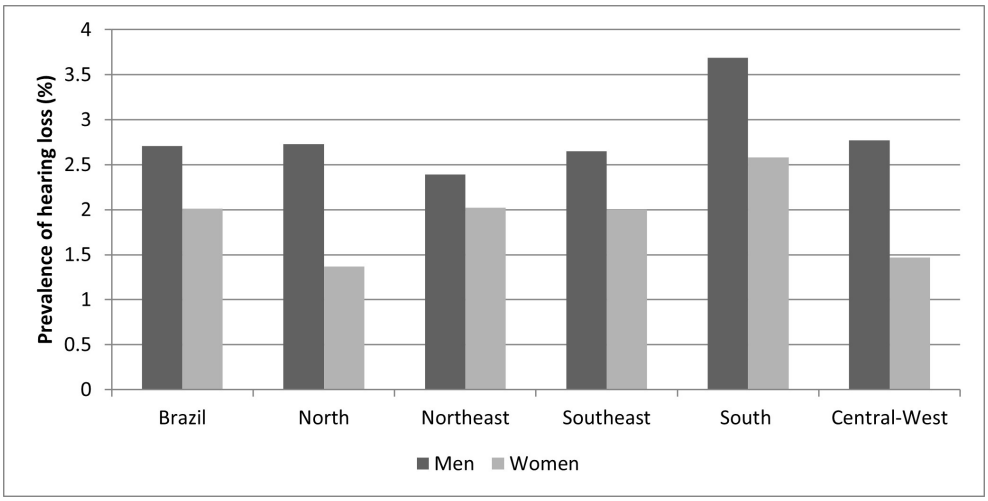


**Figure 2.** Prevalence of hearing loss per sex in Brazil and its Regions, 2013
**Source:** National Health Survey[13]
**Subtitle:** % = Percentage

**Table 2.** Estimates of life expectancy (total, free from hearing loss, and with hearing loss) at birth and 60 years old per sex, Brazil, 2013

| Region | Age | Men | | | | Women | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | $E_x$ | $LEFHL_x$ | $LEWHL_x$ | $LEWHL_x$ (%) | $E_x$ | $LEFHL_x$ | $LEWHL_x$ | $LEWHL_x$ (%) |
| Brazil | 0 years | 71.2 | 68.9 | 2.4 | 3.4 | 78.5 | 76.3 | 2.2 | 2.8 |
| North | | 68.2 | 65.7 | 2.5 | 3.7 | 75.3 | 73.7 | 1.5 | 2.0 |
| Northeast | | 68.1 | 66.3 | 1.8 | 2.7 | 76.4 | 73.6 | 2.8 | 3.7 |
| Southeast | | 73.3 | 71.1 | 2.2 | 3.0 | 79.8 | 77.8 | 2.1 | 2.6 |
| South | | 73.5 | 69.9 | 3.6 | 4.9 | 80.3 | 76.8 | 3.5 | 4.4 |
| Central-West | | 71.2 | 68.1 | 3.0 | 4.2 | 77.9 | 76.2 | 1.7 | 2.2 |
| Brazil | 60 years | 19.9 | 17.6 | 2.2 | 11.3 | 21.7 | 19.6 | 2.1 | 9.7 |
| North | | 18.7 | 16.3 | 2.4 | 12.7 | 21.6 | 20.2 | 1.4 | 6.4 |
| Northeast | | 18.9 | 16.9 | 1.9 | 10.2 | 22.4 | 20.7 | 1.7 | 7.5 |
| Southeast | | 20.4 | 18.5 | 2.0 | 9.6 | 24.1 | 22.1 | 1.9 | 7.9 |
| South | | 20.4 | 17.5 | 2.8 | 14.0 | 24.2 | 20.9 | 3.2 | 13.3 |
| Central-West | | 19.8 | 16.6 | 3.2 | 16.1 | 22.8 | 21.3 | 1.5 | 6.8 |

**Source of basic data:** National Health Survey[13]; Mortality Table for Brazil[14]
**Subtitle:** % = Percentage; Ex = Total life expectancy; LEFHLx = Life expectancy free from hearing loss; LEWHLx = Life expectancy with hearing loss; LEWHLx (%) = Proportion of years to be lived with hearing loss

## DISCUSSION

The estimated life expectancy with HL in Brazil is an essential tool to detect population indicators. In both sexes, the years lived without HL remained always higher than those with HL. In all regions, men are expected to live less and to have HL for longer than women. These findings agree with research conducted in the United States, which demonstrated that after 65 years old, men's life expectancy was of another 15.3 years without HL and 15.0 with HL[18]. Women's life expectancy was 19.3 and 19.2 years, respectively without and with HL[18].

A study estimated the prevalence of self-reported HL in older adults in São Paulo in 2011[19], which was estimated at 11.2%, reaching 46.6% in those aged 60 to 69 years[19]. Males also had a greater prevalence than women. This study found the same estimate, as men had a greater life expectancy with HL than women. The greater prevalence of HL in males agrees with studies in the literature[20,21]. Similarly, other studies found worse pure-tone hearing thresholds, especially at high frequencies, in older men than in older women[22,23].

This research also found results that confirm those obtained in a 2012 study conducted in Juiz de Fora, Minas Gerais[24], in 349 households. It included answers from 1,050 people aged 4 days to 95 years regarding disabling HL and estimated its prevalence at 5.2% of the population, with symptoms of tinnitus. The most affected ones were those above 60 years of with low educational attainment. The symptom identified in the study demonstrates the importance of information to the population regarding HL and its symptoms, hearing examinations, and self-assessment to reach a diagnosis and obtain treatment as early as possible[24]. The present research confirms the results regarding HL prevalence among males, at a 15% index. The authors admit that this rate is linked to the relationship between sex and educational attainment, occupation, and time of noise exposure, contributing to the onset of noise-induced HL[24]. According to the research, men have lower educational attainment and therefore are more resistant to seeking medical help, hindering early diagnosis and treatment. Likewise, the research indicates that men, despite their resistance to seeking specialized care, undergo periodical audiological examinations. They do not always seek a physician but are aware of their need, and men are more exposed to occupational noise because they are more frequently involved in factory and military activities[24].

The relationship between sex and the prevalence of HL was also analyzed, considering occupational factors[25]. The research verified that males are more exposed to high occupational noise levels than women. On the other hand, studies highlight that women are more concerned with health and have more time available, which leads them to seek medical help more often. Hence, they obtain a diagnosis earlier and get more timely treatment[25].

HL affects more intensely developing or underdevelopment countries[26], which can be explained by the difficulty accessing information and the lack of knowledge about hearing healthcare. The most common causes of HL are rubella infection during pregnancy, ear infections, and prolonged exposure to intense noise – the latter is one of the main causes of irreversible HL[26].

There was a relationship between the prevalence of disabling HL and the Human Development Index (HDI)[24], demonstrating that places whose HDI is high, like Denmark, have a prevalence of disabling HL of only 0.2%. In regions where the HDI is intermediate, like Thailand, the prevalence of disabling HL increases to 13.5%. Hence, a relationship can be established between higher HDI and a greater tendency to invest in public health, including efficient treatments, encouragement to make self-assessments, early diagnosis, and quality-of-life programs for this group. Data analysis in the present research also demonstrated that life expectancy with HL was higher in the Central-West, Southeast, and South –regions with the greatest economic development in Brazil. Hence, these regions are believed to have greater attention and investment in public health infrastructure, including plans to treat people with HL. This study did not estimate disabling HL among interviewees but observed a prevalence of 2.34% of individuals with acquired HL; people above 60 years old were the most affected ones, probably due to the occurrence of presbycusis in this age group.

A study conducted in the Southeast highlights this region as the one most developed economically, estimating a 5.2% prevalence of disabling HL in Juiz de Fora, Minas Gerais[27]. Such a prevalence was estimated through a sectional population study from 4 days to 95 years old, assessing 1,050 individuals in 349 households of all urban areas in that city. This index was compared with another study carried out in Canoas, in the South Region of Brazil, which estimated a prevalence of disabling HL at 6.8%. Hence, they agree with the data in the present research regarding the relationship between the regions of Brazil and the disabling HL prevalence indices. The Southeast – the most economically structured region – has the lowest prevalence, certainly, because it has more government actions, more resources for the health network, and early deaf detection programs.

Data from the 2013 NHS must be highlighted, as 94.16% of individuals with acquired HL in Brazil reported not attending any hearing rehabilitation service. This index shows the precarity of this type of assistance to individuals with HL in the country. Thus, it is important to establish an efficient hearing rehabilitation program to provide better healthcare, impacting the quality of life of people with HL. There must be not only support for individuals with HL but also structured programs to help the families deal with the limitations inherent to the disability. Hearing aids are known to be more effective when they have access to hearing rehabilitation programs, as pointed out by research conducted in Cascavél (Paraná) in older adults with presbycusis[28].

Concerning HL acquired over the years, the 2013 NHS indicated that 6.35% of the population were deaf in both ears, and 2.74% reported that their habitual activities were intensely limited because of the HL. These findings confirm the results of other studies[24,25,29]. HL knowingly brings frustrations and consequences to the person's psychological status, hindering everyday activities such as social interaction and communication. These consequences lead deaf people to a certain dependence on their families, especially when communication is mainly oral[29].

The present study found that the North, Northeast, and Central-West had the highest rates of years lived with deafness. A study in individuals who lived in communities settled along the rivers in Amazonas demonstrated that this population in the North region of the country predominantly has oral communication[30]. Considering the importance of diagnosing HL as soon as possible, self-assessment can be used as an indicator to measure and follow up on their health; it is widely

used among advanced-age people. Hence, the use of this method should be expanded along with periodical audiological monitoring of the population. This helps diagnose and identify timely any aggravated HL, thus avoiding the development of other clinical conditions related to HL that impair the quality of life, such as depression[9,10].

The present research indicated that HL prevalence increases gradually after 60 years old in both sexes, though males are more affected. This finding agrees with the results of other studies[19,20,21,24]. A population study carried out in Brazil[19] indicated a greater pre4dominance of HL in older people, representing 11.2% of the study sample. Moreover, it manifested more in men than in women, highlighting the need for greater investments in mechanisms to prevent the problem. The few concrete data on HL at birth and in the aging process may be ascribed to difficulties making hearing examinations in the population – despite their importance, along with the self-perception of such need, to ensure early HL diagnosis and treatment[19].

This study presents essential data on HL and its impact on both the expectancy and quality of life, especially among men, who are the most affected. Because the study approached only reports, instead of medical diagnoses, it may have presented imprecise data. Nonetheless, the results of studies in the same model are widely used to construct estimates on the life expectancy of people with HL and their quality of life.

Since differences in the type of HL may have different consequences on the person's health, it is important to analyze this aspect in future research. Moreover, the socioeconomic aspect of the population in the various regions of Brazil can be an important parameter to investigate the effectiveness or lack of programs to promote the quality of life of people with HL.

The present research contributed to a better understanding of the relationship between aging and HL, with its influence on older adults' quality of life. It must be also emphasized that the study used self-reported data, which are essential to the advancement of health research. Thus, the study observed the need for creating follow-up programs for this age group and the families of those with HL and offering services that minimize the limitations caused by HL. Comprehensive and multidisciplinary follow-up is indispensable, giving priority to rehabilitation and improved quality of life.

The analysis of life expectancy with HL at birth and 60 years old helped understand the population's needs and specify the most affected ages, regions, and sex. Hence, public policies can be better planned, and human and financial resources can be adequately allocated. Therefore, population studies are needed to obtain adequate indicators, reach HL diagnoses as early as possible, and include and socialize deaf people, focusing on their quality of life.

## CONCLUSION

Brazilian data from 2013 show that women had a greater life expectancy, longer life expectancy free from HL, and lived a smaller portion of their lives with HL than men, regardless of their age. At birth, life expectancy with HL is greater in the South Region of Brazil in both sexes. At 60 years old, this expectancy is greater among men in the South and women in the Southeast. This assessment of life expectancy with HL at birth and 60 years old can help understand the population's needs and describe the most affected ages, regions, and sex in further detail, enabling better public policy planning and adequate allocation of human and financial resources.

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