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# Quality of life and social determinants in individual hearing AIDS users

## *Qualidade de vida e determinantes sociais em usuários de aparelho de amplificação sonora individual*

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**Keywords**

Speech-Language and Hearing Therapy
Quality of Life
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## ABSTRACT

**Purpose**: To verify the association between quality of life, socioenvironmental aspects and general health status of users of an Auditory Health Care Service. **Methods:** Cross-sectional observational study with simple random sample. A semi-structured interview was conducted with 114 adults and elderly, aged 19-92, Individual Hearing Aids (IHA) users in an auditory health service. Participants answered questions regarding characterization, sociodemographic data and quality of life. To study the aspects of care, a search was carried out in the medical records. Mann Whitney, Chi-square and Fisher Exact tests were performed for association. The analyses were performed in the STATA software considering a 5% significance level. For the multivariate analysis, the full model was started with all significant variables at 20%. A logistic regression model was used to repeat the variables with p <5%. **Results:** The majority of the participants was female, aged over 60 years and had their first consultation with the speech-language therapist. As for WHOQOL-bref, more than half of the sample reported good quality of life and health satisfaction. Regarding the complaints associated with the majority of those who did not present dizziness, ear fullness and depression reported good quality of life. It was observed an association with statistical significance between health satisfaction, higher mean age and lower schooling. In the multivariate analysis, the effective use of hearing aids and no history of dizziness were associated with good quality of life. For the health variable it was found that not having dizziness increased the chances of being satisfied with health while each year the more schooling the chance to be satisfied reduced. **Conclusion:** The use of IHA is related to a good perception of the quality of life and health status of individuals with hearing loss.

**Descritores**

Fonoaudiologia
Qualidade de Vida
Perda Auditiva
Auxiliares da Audição

## RESUMO

**Objetivo:** Verificar a associação entre qualidade de vida, aspectos socioambientais e estado geral de saúde de usuários de um Serviço de Atenção à Saúde Auditiva. **Método:** Estudo observacional analítico do tipo transversal, com amostra aleatória simples. Realizou-se entrevista semiestruturada com 114 adultos e idosos, entre 19-92 anos, usuários de AASI atendidos em um serviço de saúde auditiva. Os participantes responderam questões referentes à caracterização, dados sociodemográficos e qualidade de vida. Para estudo dos aspectos assistenciais, realizou-se busca nos prontuários. Foram realizados os testes Mann Whitney, Quiquadrado e Exato de Fisher para associação. As análises foram realizadas no software STATA considerando 5% de significância. Para a análise multivariada, iniciou-se o modelo cheio com todas as variáveis significativas a 20%. Considerou-se modelo de regressão logística, sendo repetido até restarem as variáveis com p<5%. **Resultados:** A maioria dos participantes era do gênero feminino, com idade superior a 60 anos e realizou a primeira consulta com o fonoaudiólogo. Quanto ao WHOQOL-bref, mais da metade da amostra relatou boa qualidade de vida e satisfação com a saúde. Em relação às queixas associadas, a maioria dos que não apresentavam tontura, plenitude auricular e depressão referiu boa qualidade de vida. Observou-se associação com significância estatística entre a satisfação com a saúde, maior média de idade e menor escolaridade. Na análise multivariada, o uso efetivo do AASI e não apresentar histórico de tontura associaram-se à boa qualidade de vida. Para a variável saúde, verificou-se que não apresentar tontura aumentou as chances de estar satisfeito com a saúde, enquanto que a cada ano a mais de escolaridade a chance de estar satisfeito reduziu. **Conclusão:** O uso do AASI está relacionado a uma boa percepção da qualidade de vida e do estado de saúde de indivíduos que apresentam perda auditiva.

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**Conflict of interests:** nothing to declare.

## INTRODUCTION

Hearing is the sensory function that allows us to pick up the sounds, analyze them and assign them meaning. Hearing impairment results from decreased ability to hear sounds, and can affect the subject to varying degrees. According to the Brazilian Institute of Geography and Statistics (IBGE)[1], 5.1% of the Brazilian population has some type and degree of hearing impairment.

As a consequence of hearing loss, difficulties in communication, social isolation, depression and negative feelings can be mentioned that can directly affect the quality of life and the perception that the individual has of their health status[2-5]. The impacts of hearing loss may also have positive or negative influences on aspects related to health care, socio-demographic and clinical factors[2-3,5-8].

One of the resources that seek to minimize the damages of hearing impairment is the Individual Hearing Aid (IHA) that amplifies the sound obtained from the environment and conducts it in an audible and comfortable intensity.

The Auditory Health Care Services seek to provide assistance to people with hearing impairment, offering these individuals specialized care with doctors, social workers, psychologists and speech-language therapists. In these services, evaluation, auditory diagnosis, indication, adaptation of Individual Hearing Aids (IHA) and monitoring of already adapted users are performed.

The World Health Organization has defined quality of life as the individual's perception of their position in life, in the culture context, the value systems in which they live, and in relation to their goals, expectations, standards, and concerns[9]. Besides that, it appointed that the social determinants of health are related to the conditions in which a person lives and works, impacting the health condition and quality of life. Social, economic, cultural, ethnic / racial, psychological and behavioral factors that influence the occurrence of health problems and risk factors for the population, such as housing, food, education, income and employment, should be considered.

Evaluating the quality of life of hearing aid users can be an important indicator of the benefits of amplification, since it allows measuring the implications of a better hearing capacity in activities of daily living, leisure and communication.

The present study aimed to verify the association between quality of life, socioenvironmental aspects and general health status of users of an Auditory Health Care Service.

## METHODS

This is a cross-sectional observational study with a simple random sample composed of adults and elderly users of hearing aids (IHA) who perform follow-up at a high complexity hearing health service agreed to the Unified Health System (SUS). The present study was approved by the Ethics and Research Committee (ERC) of the institution, under the number CAAE 509.610.

All participants were informed about study objectives and procedures; they agreed to participate and signed the Free and Informed Consent Form.

For the composition of the sample, the eligibility criteria were considered: to be at least 18 years old, to be attended at the Auditory Health Care Service - HC / UFMG, to perform the preliminary audiometry examination on the day of the survey. Individuals who did not present neurological or cognitive conditions to understand the questions of the proposed instrument and did not answered completely to the questionnaires were excluded from the study.

To perform the sample calculation, the annual flow of 7680 individuals attended at the outpatient clinics constituting the Audiology Sector of the HC / UFMG: Audiology Ambulatory and Hearing Care Service. The sample calculation was based on a simple random sampling using the 99% confidence level. A total of 114 individuals attended at the Auditory Health Care Service participated in this study. The users, when attending the hearing health service, were invited to participate in the survey. The data collection was done through a semi-structured interview and consultation of the participants' records.

Concerning the explanatory variables, a questionnaire was elaborated by the researchers with questions related to socio-demographic data such as gender, age, schooling, place of residence, reasons for referral for auditory examination and the presence of diseases reported by participants.

For the analysis of the socioeconomic conditions of the participants, the Brazilian Economic Classification Criterion (BECC)[10] was applied. This is an instrument of economic segmentation that uses the survey of household characteristics regarding the presence and quantity of household items and the level of schooling of the head of the family. The BECC assigns points according to each household characteristic, making the sum of these points and the correspondence between the criteria scoring bands and the layout strata.

In order to collect care data, a search was carried out in the medical records of the participants in order to find data regarding dates of admission to the service, hearing loss perception, hearing loss diagnosis, selection and adaptation of the individual hearing aid (IHA) if the participant made effective use of the device classified by the speech-language therapist who follows the criterion of self-report of use over eight hours a day and performed hearing rehabilitation after adaptation of the hearing aids.

It was also collected the results obtained in tonal threshold audiometry. The results were classified in accordance with the literature according to type[11], grade[12] and hearing loss layout[13].

The variable response, quality of life, was measured using the World Health Organization Quality of Life questionnaire (*WHOQOL-bref)*[9], proposed by the World Health Organization (WHO). The instrument contains 26 questions with a score of 1 to 5, of which questions one and two refer to the perception of quality of life and satisfaction with general health. The other issues are distributed in the physical, psychological, environmental and social relations fields. The physical field encompasses issues related to daily life activity, dependence on medication and work capacity. The psychological field includes questions about self-esteem, body image and appearance, negative feelings, spirituality, religion, and popular beliefs. The environmental field covers issues of physical security and protection, health

and social care, opportunities to acquire information and skills, participation in / and recreation / leisure opportunities, physical environment and transportation. And the social relations field covers questions about personal relationships, social support, and sexual activity.

The questionnaire was applied individually, in a reserved room, through a semi-structured interview. The interviewer asked the participant, before the application of the questionnaire, to think about his life in the last two weeks to decide the most appropriate response to his situation. The scores were calculated by average obtainment of the responses for each field and the average value was multiplied by four. The scores of each field were converted on a scale from 0 to 100 by the Equation $\left[(field\ average \times 4)-4\right]\times\left(\frac{100}{16}\right)=value\ between\ 0\ and\ 100$. The closer to 100 the better it was considered the quality of life.

On the day of the interview, the participants attended the service to perform audiological follow-up regarding the use of hearing aid. Some individuals did not make effective use of hearing aid, according to criteria of effective use of the service, but all of them had hearing aid. The instruments used in the research were applied after consultation with the speech-language therapist, being applied in sequence, in shape of structured interview, in their own room, in a single session with an average time of 50 minutes. The variables were described by average, standard deviation, quartiles, minimum and maximum measures. Considering the sample size and the fact that they did not present normal distribution, the non-parametric Mann Whitney test was used to evaluate the difference between the groups. To evaluate the association, Fisher's exact and Chi-square tests were used. The analyses were performed in STATA software (Stata Corporation, College Station, Texas) version 12.0 considering 5% significance.

For multivariate analysis, the full model was started with all significant variables at 20%. It was considered a logistic regression model because it is a dichotomous response variable. The model was repeated until only the variables with p <5% remained.

## RESULTS

From the 114 participants, 51.8% were female gender and 73.7% lived in Belo Horizonte. The majority of the sample, 69.3%, had an age range over 60 years, with an average of 66.1 (standard deviation 15.8), a minimum of 19 and a maximum of 92 years. The average educational level was 5.5 (standard deviation 4.4), with a minimum of zero and a maximum of 16 years. The most cited economic class was C (57.9%), followed by B (25.4%) and D (16.7%).

With regard to the clinical data, it was observed that hearing loss of the sensorineural type was the one that presented the highest occurrence, adding 77.2% of the cases to the right and 77.3% to the left. The most prevalent degree of hearing loss was moderate, 37.7% on the right and 33.3% on the left. The most observed audiometric configuration was the right descending (34.2%) and the left descending (38.6%). About the complaints, 94.7% of the participants reported difficulty hearing, 37.2% reported tinnitus and 15% dizziness. The most frequently reported disease was hypertension (55.3%), followed by changes in cholesterol (21.9%), diabetes (17.5%) and heart problems (10.5%). Other diseases such as cancer, depression and hormonal problems were cited by less than 10% of participants. Concerning the perception of hearing loss, 57.6% of the participants found hearing loss in adults, 29.4% in the elderly, 10.6% in childhood and 2.4% in adolescence.

It is worth mentioning that 77.8% of the participants had the first consultation in the Hearing Health Care Service with the speech-language therapist. On the day of the interview, 85.6% of the participants attended the consultation to perform monitoring, 11.5% to replace the hearing aid and 2.9% to perform the adaptation of the device. Regarding the use of hearing aid, it was verified that 57.6% of the individuals made effective use of hearing aid. The majority of individuals, 57.6%, waited between 19 and 59 days for the hearing aid award, average of 112.7 (standard deviation 131.9), with a minimum waiting time of four and a maximum of 780 days. The waiting time for consultation with the otorhinolaryngologist had an average of 37.2 (standard deviation of 85.4), minimum of zero and maximum of 700 days. Auditory rehabilitation was not performed by 98.1% of the sample, the other participants, 1.9%, did not have the data found in the medical records.

About *WHOQOL-bref* issues regarding general quality of life and health satisfaction, 76.3% of the participants reported having a good quality of life and 72.8% said they were satisfied with their overall health status. The average response for the physical field was 66.5 (standard deviation 19.1), minimum 3,6 and maximum 96 points. For the psychological field, the average was 74.5 points (standard deviation 19.2), with a minimum of zero and a maximum of 100 points. In the social relations field, the average was 70.5 (standard deviation 21.2), minimum of zero and maximum of 100 points. In the environmental field, the average was 64.3 (standard deviation 14.3), with a minimum of 28.1 and a maximum of 100 points.

The association analysis of the *WHOQOL-bref* results regarding overall quality of life, overall health satisfaction score, and sociodemographic and care aspects are presented in the Table 1. It was possible to notice an association with statistical significance between the effective use of hearing aid and good quality of life (p = 0.012). The presence of right descending loss configuration was associated with statistical significance with quality of life (p = 0.04).

In the Table 2 it is highlighted that there was an association with statistical significance between dizziness and quality of life, most of those who did not present dizziness had a good quality of life (p = 0.00). There was also an association with statistical significance among those who did not present auricular fullness (p = 0.01) and depression (p = 0.00) with good quality of life. Very satisfied with the state of health is associated with good quality of life (p = 0.00).

In Table 3, results with statistical significance between good quality of life (p = 0.00) and the best perception of all fields evaluated by *WHOQOL-bref* can be observed. It was verified too, that there was also an association with statistical significance between satisfaction with health and higher average

**Table 1.** Association between quality of life, health and socio-demographic and care aspects

| Variables | Quality of Life | | | | Value p | Health | | | | Value p |
|---|---|---|---|---|---|---|---|---|---|---|
| | Bad | | Good | | | Unsatisfied | | Satisfied | | |
| | N | % | N | % | | N | % | N | % | |
| **Gender** | | | | | | | | | | |
| Female | 14 | 51.9 | 45 | 51.7 | 0.99 | 19 | 61.3 | 40 | 48.2 | 0.21 |
| Male | 13 | 48.1 | 42 | 48.3 | | 12 | 38.7 | 43 | 51.8 | |
| **Life-cycle** | | | | | | | | | | |
| Adult | 9 | 33.3 | 26 | 29.9 | 0.73 | 13 | 41.8 | 22 | 26.5 | 0.11 |
| Elderly | 18 | 66.7 | 61 | 70.1 | | 18 | 58.1 | 61 | 73.5 | |
| **Place of Residence** | | | | | | | | | | |
| Belo Horizonte | 21 | 77.8 | 63 | 72.4 | 0.71 | 25 | 80.6 | 59 | 71.1 | 0.54 |
| Metropolitan Region | 4 | 14.8 | 19 | 21.8 | | 5 | 16.1 | 18 | 21.7 | |
| Others | 2 | 7.4 | 5 | 5.7 | | 1 | 3.2 | 6 | 7.2 | |
| **BECC** | | | | | | | | | | |
| B | 6 | 22.2 | 23 | 26.4 | 0.83 | 9 | 29.0 | 20 | 24.1 | 0.20 |
| C | 17 | 63.0 | 49 | 56.3 | | 20 | 64.5 | 46 | 55.4 | |
| D | 4 | 14.8 | 15 | 17.2 | | 2 | 6.5 | 17 | 20.5 | |
| **Entry on the service** | | | | | | | | | | |
| Otolaryngology | 5 | 18.5 | 19 | 21.8 | 0.59 | 8 | 25.8 | 16 | 20.3 | 0.41 |
| Speech-language therapist | 22 | 81.5 | 62 | 71.3 | | 21 | 67.7 | 63 | 79.7 | |
| **Reason of the consultation** | | | | | | | | | | |
| Follow-up | 23 | 92.0 | 66 | 83.5 | 0.48 | 24 | 88.9 | 65 | 84.4 | 0.57 |
| Replacement | 2 | 8.0 | 10 | 12.7 | | 3 | 11.1 | 9 | 11.7 | |
| Adaptation | 0 | 0.0 | 3 | 3.8 | | 0 | 0.0 | 3 | 3.9 | |
| **IHA effective use** | | | | | | | | | | |
| Yes | 7 | 35.0 | 42 | 66.7 | 0.01* | 11 | 52.4 | 38 | 61.3 | 0.47 |
| No | 13 | 65.0 | 21 | 33.3 | | 10 | 47.6 | 24 | 38.7 | |
| **Age that perceived hearing loss** | | | | | | | | | | |
| 0 to 11 | 3 | 13.6 | 6 | 9.5 | 0.07 | 2 | 9.1 | 7 | 11.1 | 0.22 |
| 12 to 18 | 2 | 9.1 | 0 | 0.0 | | 1 | 4.5 | 1 | 1.6 | |
| 19 to 59 | 10 | 45.5 | 3 | 4.8 | | 16 | 72.7 | 33 | 52.4 | |
| 60+ | 7 | 31.8 | 18 | 28.6 | | 3 | 13.6 | 22 | 34.9 | |
| **Type RE** | | | | | | | | | | |
| Loss-less | 2 | 7.4 | 5 | 5.7 | 0.87 | 3 | 9.7 | 4 | 4.8 | 0.11 |
| Sensorineural | 21 | 77.8 | 67 | 77.0 | | 20 | 64.5 | 68 | 81.9 | |
| Conductive | 0 | 0.0 | 2 | 2.3 | | 0 | 0.0 | 2 | 2.4 | |
| Mixed | 4 | 14.8 | 13 | 14.9 | | 8 | 25.8 | 9 | 10.8 | |
| **Degree RE** | | | | | | | | | | |
| Normal/Mild | 10 | 37.0 | 20 | 23.0 | 0.27 | 8 | 25.8 | 22 | 26.5 | 0.26 |
| Moderate/Mod. Severe | 12 | 44.4 | 53 | 60.9 | | 15 | 48.4 | 50 | 60.2 | |
| Severe/Profound | 5 | 18.5 | 14 | 16.1 | | 8 | 25.8 | 11 | 13.3 | |
| **Layout RE** | | | | | | | | | | |
| Ascending/Horizontal | 3 | 11.1 | 25 | 28.7 | 0.04* | 8 | 25.8 | 20 | 24.1 | 0.83 |
| Descending | 24 | 88.9 | 56 | 64.4 | | 22 | 71.0 | 58 | 69.9 | |
| In U/Inverted/Inch | 0 | 0.0 | 6 | 6.9 | | 1 | 3.2 | 5 | 6.0 | |
| **Type LE** | | | | | | | | | | |
| Loss-less | 2 | 7.4 | 3 | 3.4 | 0.80 | 1 | 3.2 | 4 | 4.8 | 0.65 |
| Sensorineural | 20 | 74.1 | 64 | 73.6 | | 21 | 67.7 | 63 | 75.9 | |
| Conductive | 1 | 3.7 | 3 | 3.4 | | 1 | 3.2 | 3 | 3.6 | |
| Mixed | 4 | 14.8 | 17 | 19.5 | | 8 | 25.8 | 13 | 15.7 | |
| **Degree LE** | | | | | | | | | | |
| Normal/Mild | 8 | 29.6 | 19 | 21.8 | 0.43 | 6 | 19.4 | 21 | 25.3 | 0.14 |
| Moderate/Mod. Severe | 13 | 48.1 | 54 | 62.1 | | 16 | 51.6 | 51 | 61.4 | |
| Severe/Profound | 6 | 22.2 | 14 | 16.1 | | 9 | 29.0 | 11 | 13.3 | |
| **Layout LE** | | | | | | | | | | |
| Ascending/Horizontal | 3 | 11.1 | 21 | 24.1 | 0.34 | 8 | 25.8 | 16 | 19.3 | 0.58 |
| Descending | 22 | 81.5 | 61 | 70.1 | | 22 | 71.0 | 61 | 73.5 | |
| In U/Inverted/Inch | 2 | 7.4 | 5 | 5.7 | | 1 | 3.2 | 6 | 7.2 | |

*Significant chi-square test at 5%

**Caption:** IHA = Individual Hearing Aids; BECC = Brazil's Economic Classification Criteria; RE = Right Ear; LE = Left Ear; N = Number of subjects

**Table 2.** Association between quality of life, health and hearing complaints and diseases

| Variables | Quality of Life | | | | Value p | Health | | | | Value p |
|---|---|---|---|---|---|---|---|---|---|---|
| | Bad | | Good | | | Unsatisfied | | Satisfied | | |
| | N | % | N | % | | N | % | N | % | |
| **Difficulty to listen** | | | | | | | | | | |
| Yes | 26 | 96.3 | 81 | 94.2 | 0.99 | 29 | 93.5 | 78 | 94.0 | 0.66 |
| No | 1 | 3.7 | 5 | 5.8 | | 2 | 6.5 | 4 | 4.8 | |
| **Tinnitus** | | | | | | | | | | |
| Yes | 13 | 48.1 | 29 | 33.7 | 0.17 | 13 | 41.9 | 29 | 34.9 | 0.51 |
| No | 14 | 51.9 | 57 | 66.3 | | 18 | 58.1 | 53 | 63.9 | |
| **Tympanic perforation** | | | | | | | | | | |
| Yes | 1 | 3.7 | 5 | 5.8 | 0.99 | 1 | 3.2 | 5 | 6.0 | 0.99 |
| No | 26 | 96.3 | 81 | 94.2 | | 30 | 96.8 | 77 | 92.8 | |
| **Dizziness** | | | | | | | | | | |
| Yes | 9 | 33.3 | 8 | 9.3 | 0.00* | 9 | 29.0 | 8 | 9.6 | 0.01* |
| No | 18 | 66.7 | 78 | 90.7 | | 22 | 71.0 | 74 | 89.2 | |
| **Earache** | | | | | | | | | | |
| Yes | 3 | 11.1 | 4 | 4.7 | 0.35 | 5 | 16.1 | 2 | 2.4 | 0.01* |
| No | 24 | 88.9 | 82 | 95.3 | | 26 | 83.9 | 80 | 96.4 | |
| **Plenitude** | | | | | | | | | | |
| Yes | 7 | 25.9 | 6 | 7.0 | 0.01* | 5 | 16.1 | 8 | 9.6 | 0.34 |
| No | 20 | 74.1 | 80 | 93.0 | | 26 | 83.9 | 74 | 89.2 | |
| **Others** | | | | | | | | | | |
| Yes | 0 | 0.0 | 2 | 2.3 | 0.99 | 0 | 0.0 | 2 | 2.4 | 0.99 |
| No | 27 | 100.0 | 84 | 97.7 | | 31 | 100.0 | 80 | 96.4 | |
| **No complaints** | | | | | | | | | | |
| Yes | 8 | 29.6 | 24 | 27.6 | 0.83 | 7 | 22.6 | 25 | 30.1 | 0.42 |
| No | 19 | 70.4 | 63 | 72.4 | | 24 | 77.4 | 58 | 69.9 | |
| **Diabetes** | | | | | | | | | | |
| Yes | 4 | 14.8 | 16 | 18.4 | 0.77 | 5 | 16.1 | 15 | 18.1 | 0.80 |
| No | 23 | 85.2 | 71 | 81.6 | | 26 | 83.9 | 68 | 81.9 | |
| **Cholesterol** | | | | | | | | | | |
| Yes | 9 | 33.3 | 16 | 18.4 | 0.10 | 8 | 25.8 | 17 | 20.5 | 0.541 |
| No | 18 | 66.7 | 71 | 81.6 | | 23 | 74.2 | 66 | 79.5 | |
| **Hypertension** | | | | | | | | | | |
| Yes | 17 | 63.0 | 46 | 52.9 | 0.35 | 19 | 61.3 | 44 | 53.0 | 0.42 |
| No | 10 | 37.0 | 41 | 47.1 | | 12 | 38.7 | 39 | 47.0 | |
| **Cancer** | | | | | | | | | | |
| Yes | 1 | 3.7 | 4 | 4.6 | 0.99 | 2 | 6.5 | 3 | 3.6 | 0.61 |
| No | 26 | 96.3 | 83 | 95.4 | | 29 | 93.5 | 80 | 96.4 | |
| **Depression** | | | | | | | | | | |
| Yes | 5 | 18.5 | 1 | 1.1 | 0.00* | 6 | 19.4 | 0 | 0.0 | 0.00* |
| No | 22 | 81.5 | 86 | 98.9 | | 25 | 80.6 | 83 | 100.0 | |
| **Heart condition** | | | | | | | | | | |
| Yes | 0 | 0.0 | 12 | 13.8 | 0.06 | 3 | 9.7 | 9 | 10.8 | 0.99 |
| No | 27 | 100.0 | 75 | 86.2 | | 28 | 90.3 | 74 | 89.2 | |
| **Hormonal conditions** | | | | | | | | | | |
| Yes | 4 | 14.8 | 5 | 5.7 | 0.21 | 4 | 12.9 | 5 | 6.0 | 0.25 |
| No | 23 | 85.2 | 82 | 94.3 | | 27 | 87.1 | 78 | 94.0 | |
| **Others** | | | | | | | | | | |
| Yes | 4 | 14.8 | 13 | 14.9 | 0.99 | 9 | 29.0 | 8 | 9.6 | 0.01* |
| No | 23 | 85.2 | 74 | 85.1 | | 22 | 71.0 | 75 | 90.4 | |
| **General health status** | | | | | | | | | | |
| Unsatisfied | 13 | 48.1 | 18 | 20.7 | 0.00** | - | - | - | - | - |
| Satisfied | 14 | 51.9 | 69 | 79.3 | | - | - | - | - | - |
| **Quality of life** | | | | | | | | | | |
| Bad | - | - | - | - | - | 13 | 41.9 | 14 | 16.9 | 0.01* |
| Good | - | - | - | - | - | 18 | 58.1 | 69 | 83.1 | |

*Fisher Exact Test Significant at 5%; **Significant chi-square test at 5 %. N = Number of subjects

**Table 3.** Comparison of the descriptive aspects between the quality of life and general health status groups

| Variables | Quality of Life | | | | | | | | | Value p | Health | | | | | | | | | Value p |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Bad | | | | | Good | | | | | Unsatisfied | | | | | Satisfied | | | | |
| | N | Average | DP | Median | IQ | N | Average | DP | Median | | N | Average | DP | Median | IQ | n | Average | DP | Median | |
| Age (years) | 27 | 64.4 | 13.9 | 67.0 | 24 | 87 | 66.7 | 16.4 | 70 | 0.30 | 31 | 63.1 | 12.8 | 63.0 | 17 | 83 | 67.3 | 16.7 | 72 | 0.03* |
| Schooling (years) | 27 | 5.6 | 4.2 | 5 | 6 | 85 | 5.5 | 4.4 | 4 | 0.77 | 31 | 6.9 | 4.6 | 6 | 8 | 81 | 4.9 | 4.2 | 4 | 0.02* |
| Adaptation Time (days) | 25 | 135.4 | 161.5 | 87 | 110 | 79 | 105.6 | 121.4 | 52 | 0.10 | 27 | 136.3 | 166.3 | 90 | 114 | 77 | 104.5 | 117.7 | 52 | 0.22 |
| Waiting time for consultation with otolaryngologist (days) | 21 | 63.0 | 151.3 | 23 | 44 | 71 | 29.6 | 51.8 | 14 | 0.20 | 22 | 58.3 | 147.3 | 14 | 44 | 70 | 30.6 | 53.2 | 16 | 0.47 |
| Physical | 27 | 55.2 | 17.5 | 57.1 | 14.3 | 87 | 70.1 | 18.2 | 75 | <0.00* | 31 | 54.6 | 19.6 | 57.1 | 25.0 | 83 | 71.0 | 16.9 | 75 | <0.00 |
| Psychological | 27 | 58.9 | 22.8 | 62.5 | 25 | 87 | 79.4 | 15.1 | 79.2 | <0.00* | 31 | 58.0 | 21.5 | 62.5 | 25.0 | 83 | 80.7 | 14.1 | 79.2 | <0.00* |
| Social relations | 27 | 55.9 | 24.1 | 58.3 | 33.3 | 87 | 75.1 | 18.1 | 75.0 | <0.00* | 31 | 62.9 | 25.2 | 66.7 | 25.0 | 83 | 73.4 | 18.9 | 75.0 | 0.10 |
| Environment | 27 | 53.6 | 12.2 | 56.3 | 21.9 | 87 | 66.4 | 13.6 | 65.6 | <0.00* | 31 | 57.1 | 12.6 | 59.4 | 21.9 | 83 | 65.7 | 14.3 | 62.5 | 0.01 |

*Significant p-value at 5%
**Captions**: N = Number of subjects ; DP = Standard deviation; IQ = Interquartile range

**Table 4.** Results of the multivariate analysis between quality of life, health satisfaction and selected variables

| Characteristics | Good quality of life | | | |
|---|---|---|---|---|
| | Initial model | | Final model | |
| | OR(IC 95%) | Value-p | OR(IC 95%) | Value-p |
| Dizziness | 3.27 (0.64-16.64) | 0.15 | 6.6 (1.61-27.43) | 0.00 |
| Atrial plenitude report | 4.24 (0.68-26.31) | 0.12 | - | - |
| High cholesterol | 4.20 (0.89-19.77) | 0.06 | - | - |
| IHA effective use | 0.23 (0.05-1.00) | 0.05 | 0.32(0.10-0.98) | 0.04 |
| Discovered hearing loss between 19-59 years | 4.26 (0.52-34.94 | 0.17 | - | - |
| Discovered hearing loss over 60 years | 3.64 (0.35-37.14) | 0.27 | - | - |
| | Health satisfaction | | | |
| | Initial model | | Final model | |
| | OR(IC 95%) | Value-p | OR(IC 95%) | Value-p |
| Life cycle | 2.40(0.46-12.51) | 0.29 | - | - |
| Dizziness report | 3.89(1.25-12.06 | 0.01 | 3.78(1.27-11.29) | 0.01 |
| Age | 0.98(0.93-1.03) | 0.50 | - | - |
| Schooling | 0.90(0.80-1.00) | 0.06 | 0.90(0.81-0.99) | 0.03 |

**Caption:** IHA = Individual Hearing Aid; IC = Confidence interval; OR = Odds Ratio

age of participants (p = 0.03) and lower level of schooling (p = 0.02). Concerning the *WHOQOL-bref,* there was a relation with statistical significance between physical and psychological fields' assessments with health satisfaction.

In the Table 4 it is possible to found the final model of multivariate analysis. In the final model, remained, concerning the quality of life, the variables complaining / history of dizziness and effective use of hearing aids. The data showed that participants who did not present a history of dizziness were 6.6 times more likely to report good quality of life when compared to those with a history. Those who have already reported to do an effective use of hearing aid had a 0.23 higher chance of referring a good quality of life when compared to participants who did not make effective use of hearing aids. For the variable satisfaction with health, the variables complained / history of dizziness and schooling remained. Not showing dizziness increased the odds of being satisfied with health at 3.89. Each year that increased schooling, the chance of being satisfied with health decreased at 0.90.

## DISCUSSION

The present study looked for to verify if there is an association between the use of hearing aid and a good perception of the global quality of life and the general state of health of users of the HC / UFMG Hearing Health Service.

Concerning the sociodemographic characterization of the participants, a predominance of the elderly was observed, a fact that corroborates studies that looked for tracing the profile of patients assisted in services related to the concession of Individual Hearing Aid (IHA)[14], as well as data from the Institute Brazilian Institute of Geography and Statistics (IBGE)[1] which indicate an increase in the life expectancy of the population over 60 years old, representing in 2010, 10.8% of the general population. The predominance of female participants in the sample may be justified by the fact that women show greater adhesion to auditory health services[15], in addition to being more prevalent in the municipality at hand[1].

The average schooling up to elementary school is in agreement with data from other studies[2-3] that described the satisfaction, the conditions of assistance, access and use of hearing health services. The predominant economic class was C, which is composed of users with an average income between 2.06 and 3.4 minimum wages, a finding that corroborates data from the IBGE[1] census, which indicate that 63.2% of the population of the city of Belo Horizonte is located, in this income bracket.

Regarding the relative clinical findings, the data corroborate previous studies in terms of the predominance of the sensorineural type[7-8,16] and of the moderate degree[5-6,8,14,16]. The complaints of hearing loss, tinnitus and dizziness coincide with results of a national study that evaluated the audiological profile of adults and the elderly in the city of São Paulo[4]. As for comorbidities, hypertension, cholesterol alteration, diabetes and heart problems were observed, which corroborate the results of the study that described the profile of patients seen in the Hearing Health Program at Santa Catarina, where it was observed that 30% of the participants had hypertension, 8.9% diabetes and 3.4% cardiopathies[8].

In the present survey, most participants reported hearing loss in adulthood. According to IBGE[1] census, approximately 9.7 million Brazilians (5.1% of the population) have some degree of hearing impairment, among then around of 89.7% are older than 20 years. In a study that seeks to analyze the implications of hearing loss acquired in adults, it was verified that the age of hearing loss occurs in a higher concentration in the ages of 30 to 49 years, with the earlier incidence occurring in the age range between 20 and 29 years[17]. About the assistance aspects, as well as a study carried out in the northern region of Minas Gerais[18], which searched to know the satisfaction of hearing aid users and to identify the associated factors that interfere in the perception of care, the average time to attend the Hearing Health Care Service ranged between one day and three months,

with the waiting time for granting the hearing aid as the same average time. These data are also in agreement with a study carried out in the macroregion of Belo Horizonte that evaluated the satisfaction with the use of hearing aids in users of Hearing Health Care Services[19].

The patients' accommodation, in this present study, was made over 70% from the speech-language therapists. In hearing care services, the speech-language therapist has a leading role in the habilitation and rehabilitation of the hearing impaired individual, promoting the practical use of hearing, aiming at the improvement of the individual in the performance of daily life situations[19].

The reason for attending the consultation reported by more than three-quarters of the sample was follow-up; this result corroborates a study that pursued to analyze the outcome of hearing loss adaptation in adults and the elderly[20]. This study points out that the returns for audiological follow-up are scheduled on the same day of the hearing aid adaptation, thus justifying the large number of people attending the service for this reason.

Regarding the use of hearing aid, more than half of the sample reported to perform effective use, a value below the findings of a study carried out in São Paulo, in order to study the benefit obtained with hearing aid and the satisfaction of users accredited by SUS. According to this study, 81% of users used the device more than eight hours a day[18].

A study carried out in Santa Catarina[21], points out the need for follow-up of hearing aid users in basic care after diagnosis and adaptation. Considering that more than 90% of the participants in the present study did not perform hearing rehabilitation, there is a need to organize and articulate levels of health care to guarantee the offer of assistance to hearing loss users. A study carried out with the objective of analyzing the organization of the State Network of Attention to Hearing Health in Minas Gerais in 2009, considering the macro-regions of the State, verified that the average value of individual speech-language therapy sessions for each adapted patient is approximately ten sessions[19]. Such study also verified that the average number of speech-language therapy sessions did not follow the mean of hearing aid adaptation, and that speech-language therapy still happens at the poles of the macro regions in a decentralized way. The speech-language therapy seeks to favor the effective use of hearing aid and to improve the communicative performance of the individual.

Studies[22-23] that used *WHOQOL-bref* to measure the quality of life of hearing aid users indicate that both the quality of life and the health satisfaction of adults and the elderly tend to improve with the use of the device. The present study supports these findings, considering that more than half of the sample that used hearing aid effectively presented a good evaluation of the quality of life in the physical, psychological, social and environmental fields, conforming to with other studies carried out in Israel, Spain, Brazil and Finland[24-27]. The use of hearing aid was related to the chance of having a better quality of life. This fact can be explained by the fact that the hearing aid minimizes the impacts caused by the auditory restriction, since it provides the individual with the amplified acoustic signal reducing the individual's isolation and psychological and social damages.

The evaluation of the general state of health is directly related to the perception of the quality of life. In the present study, it was verified that being very satisfied with the state of health is associated to the good perception of quality of life. In a study that looked for verify the influence of the use of hearing aid on the score of the cognitive screening of the elderly after the adaptation, it was observed that the most reported complaints and that most impacted the overall health and hearing were tinnitus, vestibulopathy, visual alterations, hypertension, among others[28]. Participants who evaluate their overall health status show less suffering or have a lower negative impact of comorbidities and associated symptoms on quality of life. It is also worth noting the fact that those who did not report a complaint / history of dizziness presented more than six times the chance of having a good quality of life and more than three times the chance of being satisfied with health when compared to those who did not present this symptom. People who have dizziness tend to restrict physical activity, travel, social meetings, and daily life activities, impacting quality of life and health perception. In a study carried out with the objective of verifying the influence of vestibular rehabilitation on the quality of life of individuals pre- and post-therapy, there was a great influence of dizziness on physical aspects, emotional and functional status, negatively impacting the quality of life[29].

The present study evidenced that, as far as schooling increases, the chance of the hearing aid user is satisfied with health; this finding diverges from the literature. In a study carried out with the objective of verifying the self-assessment of health status and the association with sociodemographic factors, life habits and morbidity in the national population, it was observed that the lower level of schooling had a strong association with a bad self-assessment of health status[30].

The decrease in the capacity to listen generates a decline in the individual's communicative capacity, leading to isolation and deprivation of information and communication, which can lead to the appearance of symptoms of depression. In a study conducted with the aim of establishing the profile of hearing aid users with a view to cognition, it was observed that more than 40% of the study participants presented depressive manifestations in different degrees[5].

As a limitation of this study, it is possible to mention the collection of the assistance data through consultation of the participants' medical records, which can lead to omissions because of the style or quality of the information.

## CONCLUSION

The present study allowed verifying that users who use hearing aid effectively have a greater chance of presenting a good perception of global quality of life. The quality of life of hearing aid users is related to several socio-environmental, demographic and clinical factors, as well as the perception of the general state of health that can be influenced by factors such as the presence of dizziness and education level.

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## Author contributions

*UASLR participated in data collection, data analysis and interpretation and writing of the article; VCS participated in the idealization of the study and data collection and revision of the manuscripts. SMAL participated, in the condition of guiding, the idealization of the study, data analysis and interpretation and correction of the manuscript.*