

PREVALENCE AND DETERMINANTS OF TINNITUS AMONG OLDER ADULTS IN NIGERIA: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background

Tinnitus, the perception of sound without an external source, is a frequent complaint among older adults, often linked to hearing loss, hypertension, and noise exposure. Despite its impact on quality of life, tinnitus remains under-recognized in Sub-Saharan Africa. This study aimed to determine the prevalence and determinants of tinnitus among elderly patients in a tertiary hospital in southern Nigeria.

Methods

A hospital-based cross-sectional study was conducted among 423 adults aged ≥ 60 years attending the General Practice Clinic of the University of Benin Teaching Hospital, Benin City, between December 2017 and June 2018. Participants were recruited consecutively and assessed using a structured questionnaire, otologic examination, and audiometric testing. Data were analyzed with IBM SPSS version 22, and logistic regression identified independent predictors of tinnitus. Statistical significance was set at $p < 0.05$.

Results

The mean age of respondents was 67.5 ± 7.3 years, and females comprised 64.8% of the sample. The prevalence of tinnitus was 32.4% (137 of 423). Logistic regression revealed that hypertension (OR = 2.96; 95% CI: 1.89–3.62; $p = 0.039$), vertigo (OR = 1.35; 95% CI: 1.77–5.68; $p = 0.043$), and noise exposure (OR = 2.24; 95% CI: 1.03–5.99; $p = 0.044$) were significantly associated with tinnitus. Age, sex, marital status, and diabetes were not statistically significant predictors.

Conclusion

Tinnitus affected about one-third of older adults studied, underscoring a substantial geriatric health concern. Hypertension, vertigo, and chronic noise exposure were key determinants. Incorporating tinnitus screening into routine geriatric care, optimizing cardiovascular health, and promoting hearing health could help reduce the burden of tinnitus in Nigeria's aging population.

Keywords: Tinnitus, Elderly, Hypertension, Vertigo, Noise exposure, Geriatric hearing health, Nigeria

BACKGROUND

Tinnitus, commonly defined as the perception of sound in the absence of an external auditory stimulus, is a significant global public health concern, particularly among older adults.¹ The global pooled prevalence of tinnitus among adults has been estimated at approximately 14%, with severe tinnitus affecting about 2% of the population.^{2,3} The condition is strongly age-dependent, with prevalence increasing from around 10% in younger adults to 24–30% in older age groups.³ Age-related auditory degeneration, cumulative lifetime noise exposure, metabolic disorders, and vascular changes are key contributors to this heightened risk among the elderly.^{4,5}

The global burden of tinnitus extends beyond auditory impairment, as it is frequently associated with anxiety, depression, insomnia, and reduced quality of life.⁶ In older adults, tinnitus often coexists with presbycusis (age-related hearing loss), complicating communication, social engagement, and cognitive function.⁷ Furthermore, the use of ototoxic medications such as aminoglycosides, loop diuretics, and non-steroidal anti-inflammatory drugs, which are commonly prescribed in older age groups, further heightens vulnerability.⁸ Despite advances in diagnosis and management, tinnitus remains under-recognized and undertreated globally, particularly in low- and middle-income countries.

In Africa, auditory health disorders, including tinnitus, represent an underappreciated and growing burden. According to the World Health Organization (2023), more than 40 million Africans currently live with hearing loss, a number projected to reach 54 million by 2030 if current trends persist.⁹ While epidemiological data on tinnitus remain

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limited across sub-Saharan Africa, available studies suggest a prevalence ranging from 13% to 20% among adults.^{10,11}

Moreover, the scarcity of audiological services and inadequate public health prioritization of hearing care compound the challenge of early identification and management in elderly populations.¹²

In Nigeria, tinnitus poses a notable though often under-documented challenge in geriatric health. Several hospital-based studies have reported prevalence rates between 14% and 42% among adults and older patients.^{13,14} Contributory factors identified in these populations include occupational and environmental noise exposure, hypertension, diabetes mellitus, hyperlipidemia, and use of ototoxic medications, conditions that are increasingly prevalent among Nigeria's aging population.

Despite its frequency and potential for significant psychosocial distress, tinnitus remains a neglected aspect of geriatric care in Nigeria. Awareness is low, screening is seldom routine, and rehabilitative options are limited by cost and availability. As the Nigerian population continues to age, projected to be the world's third most populous country by 2050,¹⁵ the need to understand modifiable and non-modifiable risk factors for tinnitus among the elderly becomes increasingly urgent. Identifying these risk determinants is crucial for designing preventive strategies,

informing clinical management, and reducing the broader public health impact of auditory disorders in the elderly.

METHODOLOGY

Study Area

This hospital-based study was conducted at the General Practice Clinic of the University of Benin Teaching Hospital (UBTH), Ugbowo, Benin City, Edo State, Nigeria. UBTH is a major tertiary referral center serving southern Nigeria. Benin City is cosmopolitan, with Bini as the predominant ethnic group alongside Esan, Etsako, and other Nigerian ethnicities; the population comprises civil servants, traders, artisans, farmers, and students. The clinic operates Monday to Friday from 08:00 to 16:00 and attends to approximately 15–20 geriatric patients daily.

Study Design and Population

We employed a hospital-based cross-sectional design with prospective enrollment of patients aged ≥ 60 years who attended the General Practice Clinic between December 2017 and June 2018. Inclusion required clinical stability and provision of written informed consent. Exclusion criteria were critical illness, cognitive impairment or unstable mental state, and acute otologic infection at presentation.

Sample Size and Sampling

Using the Leslie Kish formula for cross-sectional studies with an expected prevalence (P) of 0.50, 95% confidence ($Z=1.96$), and precision of 0.05, the minimum sample was 384.16. Allowing 10% for attrition yielded a target sample size of 423. Eligible participants were recruited consecutively until this sample was achieved.

Data Collection

An interviewer-administered, pre-tested questionnaire obtained socio-

demographic data; tinnitus characteristics (onset, duration, laterality, perceived severity); exposures (lifetime noise, ototoxic medications, head injury); and comorbidities (e.g., hypertension, diabetes). After consent, each participant underwent general and otologic examination. Otoscopy assessed the external canal and tympanic membrane; Rinne and Weber tests screened for conductive versus sensorineural patterns. Pure-tone audiometry (air conduction 250–8000 Hz; bone conduction 500–4000 Hz) was performed in a sound-attenuated room; the pure-tone average (PTA) was calculated from thresholds at 500, 1000, 2000, and 4000 Hz. Tympanometry evaluated middle-ear status. Tinnitus was defined as a subjective perception of sound without an external source persisting for ≥ 5 minutes. Hearing thresholds were classified using WHO categories current to the study period (≤ 25 dB normal; 26–40 mild; 41–60 moderate; 61–80 severe; ≥ 81 profound).

Data Analysis

Data were entered into IBM SPSS Statistics version 22. Categorical variables were summarized as frequencies and percentages; continuous variables as means and standard deviations or medians with interquartile ranges, as appropriate. Associations with tinnitus were examined using logistic regression models to identify independent predictors. Statistical significance was set at $p < 0.05$.

Ethical Considerations

Ethical approval was obtained from the University of Benin Teaching Hospital Research and Ethics Committee, and written informed consent was obtained from all participants. Confidentiality and anonymity were maintained throughout. All data were anonymized and stored securely to ensure confidentiality. Participants found to have otologic

disorders were appropriately referred for management.

RESULTS

Sociodemographic Characteristics of Respondents

A total of 423 elderly patients participated in the study. The mean age was 67.5 ± 7.3 years. More than half of the respondents, 235 (55.6%), were aged 60–69 years, 132 (31.2%) were 70–79 years, and 56 (13.2%) were 80–89 years old. Females accounted for most participants, 274 (64.8%), while males comprised 149 (35.2%).

Most respondents were Christians 385 (91.0%), with smaller proportions

practicing Islam 12 (2.8%) and African Traditional Religion 26 (6.1%). The majority were married 319 (75.4%), while 37 (8.7%) were widowed, 29 (6.9%) single, 22 (5.2%) divorced, and 16 (3.8%) separated.

Among the 361 participants who disclosed their income, 182 (50.4%) earned less than ₦20 000 per month, 99 (27.4%) earned ₦20 000–₦40 000, and only 10 (2.8%) earned more than ₦150 000. The Bini ethnic group predominated 230 (54.4%), followed by Esan 90 (21.3%), Yoruba 33 (7.8%), Igbo 17 (4.0%), Etsako 14 (3.3%), Hausa 5 (1.2%), and others 34 (8.0%).

Table 1: Sociodemographic characteristics of respondents

Variables	Frequency (n=423)	Percentage (%)
Age		
60-69	235	55.6
70-79	132	31.2
80-89	56	13.2
Mean $\pm$ S.D	67.52 $\pm$ 7.3	
Sex		
Male	149	35.2
Female	274	64.8
Religion		
Christianity	385	91.0
Islam	12	2.8
African Traditional Religion	26	6.1
Marital status		
Married	319	75.4
Widowed	37	8.7
Single	29	6.9
Divorced	22	5.2
Separated	16	3.8

Monthly income (₦)**(n = 361)**

<N20,000	182	50.4
N20,000-40,000	99	27.4
N40,000-60,000	39	10.8
N60,000-80,000	25	6.9
N80,000-150,000	6	1.7
>150,000	10	2.8

Ethnicity

Bini	230	54.4
Esan	90	21.3
Other	34	8.0
Yoruba	33	7.8
Igbo	17	4.0
Etsako	14	3.3
Hausa	5	1.2

****Some respondents did not answer the question***

Prevalence of Tinnitus (Figure 1)

Out of the 423 respondents, 137 (32.4%) reported experiencing tinnitus, while 286 (67.6%) did not.

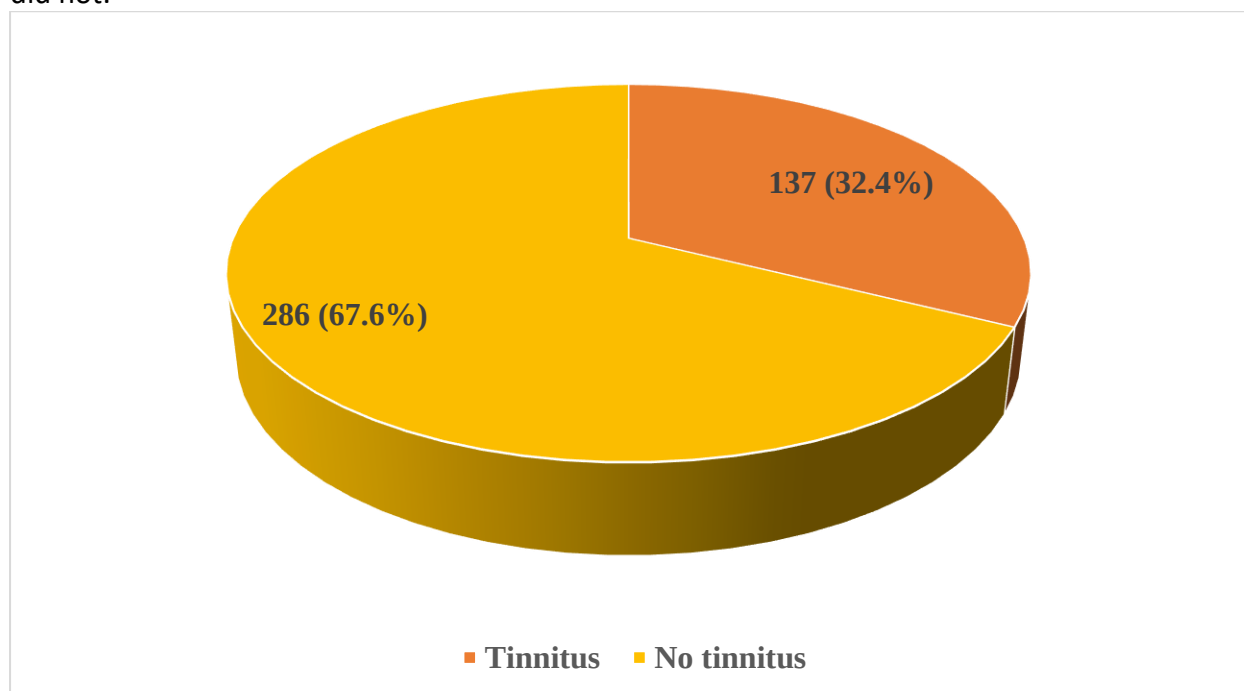


Figure 1: Prevalence of tinnitus among respondents

Socio-Demographic Factors Associated with Tinnitus

Although the odds of tinnitus were higher among respondents aged 80–89 years (OR = 2.17; 95% CI: 0.62–8.06) compared with those aged 60–69 years, this association was not statistically significant ($p = 0.205$). Females also had greater odds of tinnitus (OR = 1.90; 95% CI: 0.52–2.92) compared

with males, but the difference did not reach significance ($p = 0.063$).

Income level and marital status showed no significant relationships with tinnitus ($p > 0.05$). Respondents earning ₦40 000–₦60 000 monthly had slightly higher odds (OR = 1.52; 95% CI: 0.19–3.29) compared with those earning below ₦20 000, but the association was not significant ($p = 0.502$).

Table 2: Logistic Regression of Socio-Demographic Risk Factors for Tinnitus in the Elderly

Variables	OR (95% CI)	p value
Age		
60-69*	1	
70-79	1.311 (0.304-5.130)	0.083
80-89	2.171 (0.617-8.062)	0.205
Sex		
Male*	1	
Female	1.90 (0.518-2.918)	0.063
Income level		
<N20,000*	1	
N20,000-40,000	0.254 (0.246-3.079)	0.105
N40,000-60,000	1.521 (0.190-3.290)	0.502
N60,000-80,000	0.835 (0.296-6.696)	0.225
N80,000-150,000	0.471 (0.084-3.175)	0.527
>150,000	0.237 (0.107-1.880)	0.126
Marital status		
Single*	1	
Married	0.260 (0.036-4.098)	0.442
Separated	0.259 (0.029-2.810)	0.211
Divorced	0.300 (0.126-3.068)	0.110
Widowed	0.189 (0.033-6.164)	0.526

*Reference category

Clinical and Exposure-Related Predictors

Significant predictors of tinnitus in the elderly included vertigo (OR = 1.35; 95% CI: 1.77–5.68; $p = 0.043$), hypertension (OR = 2.96; 95% CI: 1.89–3.62; $p = 0.039$), and noise exposure (OR = 2.24; 95% CI: 1.03–5.99; $p = 0.044$).

Although family history of ear disease (OR = 1.34; $p = 0.052$) and other chronic

medical conditions (OR = 0.54; $p = 0.073$) showed borderline associations, they were not statistically significant. Diabetes, ototoxic drug use, and previous ear or head trauma had no significant correlation with tinnitus ($p > 0.05$).

Table 3: Clinical and Exposure Predictors of Tinnitus in the Elderly

Variables	OR (95% CI)	P value
Vertigo	1.350 (1.768 - 5.678)	0.043
Hypertension	2.960 (1.891 - 3.623)	0.039
Diabetes	1.111 (0.621 - 2.112)	0.203
Other chronic medical condition	0.541 (0.293 - 2.050)	0.073
Family History of ear disease	1.343 (0.724 - 4.125)	0.052
History of trauma to ear	1.950 (0.117 - 2.261)	0.662
History of trauma to head	0.217 (0.029 - 3.317)	0.527
Noise exposure	2.240 (1.031 - 5.990)	0.044
Ototoxicity	1.721 (0.181 - 4.154)	0.146
Previous ear disease	0.291 (0.408 - 3.122)	0.531
Previous air or sea travel	1.391 (0.161 - 6.410)	0.790
Throat complaint	0.181 (0.710 - 1.910)	0.390

Discussion

This study investigated the prevalence and risk factors associated with tinnitus among elderly patients attending the General Practice Clinic of the University of Benin Teaching Hospital, Benin City. The findings revealed a tinnitus prevalence of 32.4%, indicating that nearly one in three elderly individuals experienced the symptom. This figure shows tinnitus as a significant geriatric health concern in Nigeria.

The prevalence obtained in this study is higher than the 14.1% reported by Lasisi et al.¹⁶ among community-dwelling elderly Nigerians and exceeds the global pooled prevalence of approximately 14% estimated by Biswas et al.² The observed difference may reflect variations in study design, setting, and diagnostic criteria. Whereas community-based studies often include individuals with milder or undiagnosed auditory complaints, hospital-based populations such as ours are more likely to include patients with chronic diseases and otologic symptoms that predispose to tinnitus. Similar elevated rates have been documented in hospital-based studies in Ghana and South Africa, where prevalence values ranged from 20–55%.^{17,18} These findings collectively highlight the increasing burden of tinnitus in sub-Saharan Africa's aging population. Although the present study found a higher frequency of tinnitus among females, the association was not statistically significant. Gender differences in tinnitus have been inconsistently reported; some studies observed a male predominance attributed to occupational noise exposure,¹⁹ whereas others noted higher prevalence among females, possibly due to hormonal and psychosocial influences.²⁰ The lack of significance in this study may suggest that, beyond gender, other factors such as comorbid conditions and environmental exposures play a greater role in tinnitus manifestation in older adults.

Age showed a positive but non-significant association with tinnitus, with participants aged 80 years and above having the highest odds. This aligns with the well-recognized influence of aging on cochlear degeneration, neural reorganization, and cumulative noise exposure.^{21,22} The absence of statistical significance could result from sample distribution or overlapping comorbidities that mediate age-related auditory dysfunction.

Three factors, namely hypertension, vertigo, and noise exposure, emerged as significant predictors of tinnitus. The strong association with hypertension supports previous reports linking vascular compromise and altered cochlear microcirculation to tinnitus generation.²³ Elevated blood pressure may induce oxidative stress and endothelial damage within the inner ear, exacerbating cochlear pathology. The relationship with vertigo likely reflects shared inner-ear pathophysiology, including labyrinthine or vestibulocochlear dysfunction. Similarly, noise exposure has long been established as a leading environmental cause of tinnitus; chronic exposure to loud sounds can damage cochlear hair cells and auditory nerve fibers, producing both hearing loss and phantom auditory perception.²⁴

Other factors such as diabetes, ototoxic drug use, and previous head or ear trauma showed no significant associations in this study. While these variables are known risk factors, their effects may vary depending on duration, cumulative exposure, and co-occurring systemic illnesses. The near-significant association with family history of ear disease suggests a possible genetic or hereditary predisposition that merits further investigation.

The observed high prevalence and clustering of vascular and environmental risk factors emphasize the need for targeted screening and preventive strategies in geriatric care. Regular

blood pressure monitoring, early detection of hearing loss, and public education on noise avoidance could substantially reduce the burden of tinnitus in this population. Moreover, clinicians should maintain a high index of suspicion for tinnitus among hypertensive or noise-exposed elderly patients, as timely intervention may improve quality of life and reduce psychological distress.

A limitation of this study is its hospital-based cross-sectional design, which restricts generalization to community populations and precludes causal inference. Self-reported noise exposure and medical history may also introduce recall bias. Nonetheless, the study provides robust baseline data on tinnitus burden and associated factors in an elderly Nigerian cohort.

Conclusion

Tinnitus was found to be a common otologic complaint among elderly patients attending the University of Benin Teaching Hospital, affecting about a third of respondents. Hypertension, vertigo, and noise exposure were identified as significant predictors, suggesting that both systemic vascular and environmental factors contribute to its occurrence. Routine auditory screening, aggressive control of cardiovascular risk factors, and community education on noise prevention are essential to reduce the burden of tinnitus in Nigeria's aging population. Integrating tinnitus evaluation into geriatric care services could improve early diagnosis, enhance quality of life, and reduce the psychosocial impact of this often-neglected condition.

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