STROBE Statement—checklist of items that should be included in reports of observational studies

	Item No.	Recommendation	Page No.
Title and abstract	1	**Title:** Trends and driving factors of age-related hearing loss and severity over 30 years: a cross-sectional study	1
		Background: The global burden of AHL and underexplored driving factors. **Methods:** GBD 2021 data analysis (1992–2021), stratified mthods,m Bayesian spatiotemporal regression, etc. **Results:** Rising trend in AHL burden, regional disparities, impact of SDI and occupational noise. **Conclusion:** Calls for prioritizing occupational noise protection and region-specific interventions.	4-5
Introduction			5-7
Background/rationale	2	AHL is a modifiable risk factor for chronic disability and cognitive decline in adults over 60 years globally	
Objectives	3	Quantifying the global burden, trends, and driving factors (e.g., occupational noise) of AHL.	
Methods			7-10
Study design	4	This study is a population-based ecological observational study analyzing long-term trends in GBD data from 1992 to 2021.	
Setting	5	The data source has been specified (GBD 2021 covers 204 countries) and the analysis tool used (GHDx).	
Participants	6	**Inclusion Criteria:** Individuals aged 60-89 with age-related hearing loss (AHL) from countries and regions that meet the criteria in the GBD database. **Exclusion Criteria:** Individuals with hearing loss due to non-age-related factors, or those with incomplete or invalid data. **Source and Selection Method:** - Data source: GBD 2021 database. - Selection method: Data extracted from eligible global populations, with a focus on the 60-89 age group and specific subgroups (e.g., individuals with occupational noise exposure).	
Variables	7	**Outcomes:** AHL prevalence, YLDs. **Exposure:** SDI, occupational noise exposure (≥85 dB). **Confounding/Effect Modifying Variables:** Age, gender, region.	
Data sources/ measurement	8*	Data for this study were derived from the GBD 2021 (http://ghdx.healthdata.org/gbd-2021/datainput-sources)	
Bias	9	**Selection Bias:** GBD data underrepresentation in low-income countries. **Measurement Bias:** Noise ~~exposure relies on model estimation rather than direct~~ measurement. **Mitigation:** Bayesian models were used to correct for spatial heterogeneity.	
Study size	10	The implied sample size is the global population covered by GBD (no separate calculation is required).	

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Quantitative variables	11	Hearing loss can be classified as mild (threshold 20-34 dB), moderate (threshold 35-49 dB), moderately severe (threshold 50-64 dB), severe (threshold 65-79 dB), profound (threshold 80-94 dB), and complete (threshold greater than 95 dB)
Statistical methods	12	We employed descriptive statistics, joinpoint regression, age-period-cohort analysis, and multivariable regression to control for confounding factors such as age, socioeconomic status, occupational noise exposure, and demographic changes, ensuring the accuracy and reliability of the results. Missing data were addressed using multiple imputation methods to ensure the robustness of the analysis and minimize bias in the results. Confounding Control: During multivariate analysis, we controlled for several potential confounders that could affect the AHL burden, including population size, age structure, occupational noise exposure, and socioeconomic status. Stratified analysis and regression models were used to ensure that the reported results reflect the independent effects of each variable.
Results		10-23
Participants	13*	Data coverage (204 countries) and time span (1992-2021) were reported.
Descriptive data	14*	Age subgroups (60 – 64, 65 – 69, 70 – 74, 75 – 79, 80 – 84, and 85 – 89 years), gender distribution, SDI stratification Hearing loss can be classified as mild (threshold 20-34 dB), moderate (threshold 35-49 dB), moderately severe (threshold 50-64 dB), severe (threshold 65-79 dB), profound (threshold 80-94 dB), and complete (threshold greater than 95 dB)
Outcome data	15*	Globally, the AHL prevalence was 65828.75per 100,000 in 2021 and there was an overall increasing trend in both AHL-related prevalence and YLDs among older adults between 1992 and 2021
Main results	16	The global burden and severity of age-related hearing loss (AHL) are on the rise, with particularly significant impacts in low- and middle-income countries and specific age groups (e.g., 60-89 years); Men are disproportionately affected by AHL compared to women, and older adults in regions with moderate SDI are particularly vulnerable Population growth and aging are the primary driving factors behind the increasing AHL burden; Occupational noise exposure has been identified as a major risk factor for AHL, particularly in high-noise industries, with a more significant impact in low-income countries;

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Other analyses	17	Reporting subgroup analyses (sex, age, SDI) and sensitivity analyses (COVID-19 modeling)	
Discussion			
Key results	18	The global burden of AHL is rising and occupational noise is a key intervenable factor.	23-28
Limitations	19	GBD data exclude factors like genetics, environmental noise, chronic diseases, and medication use, which could affect hearing health in older populations. Future research should explore these factors and their interactions.	
Interpretation	20	Priority of occupational noise interventions for industrialized countries.	
Generalisability	21	Indicates that the results are applicable to medium and high SDI countries and need to be customized for low-income countries.	
Other information			
Funding	22	the Research Fund of Anhui Institute of translational medicine [Grant No. 2022zhyx-C36]; the Anhui Province Key Laboratory of High Field Magnetic Resonance Imaging [Grant No. KFKT-2022-0001] and the Anhui Provincial Health Research Program [Grant No. AHWJ2023A20196]	3

*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at www.strobe-statement.org.