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Gender differences in self-reported hearing loss and hearing aid use: a cross-national comparison

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ABSTRACT

Background Objective measurements estimated that 1.57 billion people globally had hearing loss in 2019. However, where audiologists are sparse, self-reported measures have been suggested as alternatives to assess burden. Moreover, research suggests this number varies by gender, due to biological and social mechanisms. Further refining our knowledge of the global prevalence of hearing loss will provide better understanding of which groups are most affected and how to best allocate resources.

Methods Using Gateway to Global Ageing data and the South African National Income Dynamics Study, we estimated the prevalence and men:women ratio of self-reported hearing loss and hearing aid use for 28 countries. Hearing loss was measured as having fair/poor hearing or reporting hearing aid use. We included 664 580 observations of individuals aged 50+ years.

Results We found that the four countries with the highest levels of hearing loss (China 65%, South Korea 39%, Mexico 33%, Brazil 31%) also had the lowest reported hearing aid use (as low as 1% in China). Though men were more likely than women to report hearing loss in nearly all countries, especially in regions with higher hearing aid use (USA, Northern/Western Europe), China, South Korea and South Africa reported no gender difference. As the prevalence of hearing loss and hearing aid use increased with age, gender differences generally decreased.

Conclusion International variation underscores the importance of country context in shaping perceived hearing and hearing aid use. Regions with high levels of hearing loss and low hearing aid use may be especially amenable to interventions.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Data on hearing loss prevalence is limited, partly due to barriers in hearing care services globally. Men are generally more likely to experience hearing loss, though not much is known about global variation in gender differences.

WHAT THIS STUDY ADDS

⇒ Results highlight cross-national heterogeneity in hearing loss and hearing aid use. In particular, we found that the four countries with the highest reported levels of hearing loss (China, South Korea, Mexico, Brazil) reported the lowest use of hearing aids. We also found that while men were more likely to report hearing loss in most countries, China and South Korea lacked gender differences.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE, OR POLICY

⇒ Our results underscore the wide-ranging contribution of country and gender contexts in producing self-reports of hearing loss and hearing aid use, especially in comparison to existing objective estimates.

INTRODUCTION

Hearing loss (HL) and hearing healthcare are increasingly being recognised as global health issues,[1 2] with numerous reports drawing unprecedented attention to hearing health and the global need for increased accessibility and affordability of hearing healthcare.[3–6] This momentum is important, as HL in adults has been linked to a host of adverse outcomes, including depression, loneliness, social isolation, falls and fall-related injuries, postoperative complications following surgery, cardiovascular disease, cognitive decline and mortality.[7–13]

The negative consequences of HL are exacerbated by the magnitude of the condition. The Global Burden of Disease (GBD) Study 2019 estimated that one in five (20.3% or 1.57 billion) people globally had HL in 2019 and projected that the number of people with HL will increase by 56.1% in the next 30 years to 2.45 billion people by 2050.[14] The report also calculated the distribution of the 403.3 million individuals with moderate or higher levels of HL in the better ear across the six WHO regions, with the majority residing in the South-East Asia and Western Pacific regions. While the African and Eastern Mediterranean regions currently have the smallest populations of people with HL, these regions are projected to experience the greatest percentage increase in HL by 2050.

While these calculations are integral to our understanding of the scope of HL, the authors of the GBD report acknowledge some limitations to their estimates. First, the GBD report notes that data on HL prevalence are limited, particularly in low- and middle-income countries (LMICs). Such a limitation suggests that the estimates published in the report may be an underestimation of the true prevalence of HL in these regions.[14]

Second, the authors of the GBD report point out that there are known barriers to ear and hearing care services globally, especially in LMICs. A scoping review of barriers to ear and hearing care services in LMICs showed that these regions often lack adequately trained healthcare professionals, appropriate equipment for testing hearing and the infrastructure to treat or manage hearing-related conditions.[15] Because LMICs often have insufficient access to the audiometric technologies required to diagnose HL, the authors of the GBD report suggest that alternative measures, such as self-reported data on hearing, may be one means for assessing disease burden in regions where audiologists are sparse.[14 15]

Further refining our knowledge of HL prevalence around the world will allow us to document better which groups of people are most affected and how best to allocate resources. For example, country comparisons of HL prevalence may help contextualise gender differences in hearing.[16] Broadly, research tends to find that men of all ages have a greater prevalence of HL compared with women in Australia,[17] Canada,[18] USA[19 20] and Europe.[21] This pattern may be due to biological factors: on the one hand, there is evidence of slight sex differences in ear electrophysiology which may make the male ear more sensitive to ageing,[22] and on the other hand, oestrogen and its signalling pathways may be protective against HL in females.[23 24] While sex differences explain some of the observed gender differences in hearing, sex differences likely interact with complex cultural elements that vary by country.

For example, previous research has shown that cultural and social norms around gender may lead to differential exposure to risk factors for HL.[24 25] Several studies have shown that men are more likely than women to be employed in jobs at high risk for noise exposure in the USA,[26 27] New Zealand,[28] Italy[29] and Latin America.[30] Moreover, in Denmark, even when men and women are both at risk of injury from occupational noise exposure, men are at higher risk than women.[31] Gender roles and norms may also create systems in which men are reluctant or unwilling to seek help from medical professionals when they experience a health problem.[32 33] This pattern has been shown across different contexts, including Germany,[34] England[35] and China.[36]

Hearing aid (HA) use varies widely across gender and country contexts and likely reflects inequality in medical and educational systems. For example, women might face more barriers in accessing healthcare services due to social norms or economic constraints,[37] which can affect their ability to get HAs.[38] Similarly, in countries with less-developed healthcare systems, both men and women might struggle to access these devices, but the impact can be more pronounced for women due to additional layers of inequality.[39] These disparities are problematic, as the benefits of HA use extend beyond improved hearing. For example, regular HA use reduces some of the health risks associated with HL in older adults, including cognitive decline[40] and mortality.[41] Further research on gender differences in the prevalence of both HL and HA use is needed to develop interventions that equitably allocate resources in culturally sensitive ways that account for gender-specific challenges.

Building on this prior literature, the current study investigates self-reported HL and HA use in 28 countries, with an emphasis on the relationship that gender has with these outcomes.

METHODS

Data sources

Data come from eight nationally representative, prospective, longitudinal studies representing 28 countries for the period 2001–2021 (listed in online supplemental appendix I). These studies collect extensive data on the demographic, socioeconomic, behavioural and health characteristics of adults. The sampling design, implementation and study details for each survey have been documented extensively elsewhere: the Brazilian Longitudinal Study of Ageing (ELSI-Brazil, 2016–2020)[42]; the China Health and Retirement Longitudinal Study (CHARLS, 2011–2018)[43]; the Costa Rican Longevity and Healthy Ageing Study (CRELES, 2005–2009)[44]; the Mexican Health and Ageing Study (MHAS, 2001–2021)[45]; the South African National Income Dynamics Study (NIDS, 2008–2017); the Korean Longitudinal Study of Ageing (KLoSA, 2006–2020)[46]; the Health and Retirement Study from the USA (HRS, 2002–2020)[47]; and the Survey of Health, Ageing and Retirement in Europe (SHARE, 2004–2015).[48] In line with previous SHARE studies,[21 49 50] we grouped the participating countries into the following regions: Central and Eastern Europe (Croatia, Czechia, Estonia, Hungary, Poland and Slovenia), Northern Europe (Denmark and Sweden), Southern Europe (Greece, Italy, Portugal and Spain), Western Europe (Austria, Belgium, France, Germany, Ireland, Luxembourg, the Netherlands and Switzerland), and Israel. Except for NIDS, all studies are part of the Gateway to Global Ageing Data, which are a collection of harmonised studies focused on understanding the health, ageing and retirement of older adults over time.[51] The Gateway to Global Ageing Data includes a different South African study (Health and Ageing in Africa: A Longitudinal Study of an INDEPTH Community in South Africa, HAALSI),[52] but we included NIDS because it is more nationally representative and has longer follow-up time.

The 2012 wave from MHAS was not included in this study because it was the only wave in which self-rated hearing was only asked to participants who answered

'yes' to using an HA. In SHARE, the number of waves included in this study varies for each country because of different starting dates of the survey. Additionally, waves 7–9 of SHARE were not included because HA use was only assessed for participants who reported owning an HA. Online supplemental appendix I and II provide additional information on each survey, including study waves, minimum inclusion age, sampling design, and the specific questions and responses for how gender was measured. Questions and possible responses were copied directly from the first questionnaire included in this study (eg, from wave 2002 of the HRS), both in English and the language the questionnaire was administered, where possible. Online supplemental appendix III details the years included from each country and survey.

Analytic sample

We included a total of 664 580 observations of individuals aged 50 and older with complete demographic and outcome information. Online supplemental appendix IV provides information on sample selection from each survey.

Hearing status

Hearing status was derived from two self-report questions. Participants: (1) report whether they use an HA (no/yes) and (2) rate their hearing (while wearing an HA, if applicable). All studies asked respondents to rate their hearing, usually on a scale from excellent to poor; however, the response options to the items included varied slightly. While most countries ask respondents to rate hearing on the same scale (Excellent, Very Good, Good, Fair, Poor), a number of countries use slightly different categories. Brazil and South Korea, for example, introduce a 'Very Bad' category, while respondents in Costa Rica rate their hearing on a seven-point scale. We combine these two hearing status items to define an individual as not having HL if they report excellent, very good or good hearing *and* do not wear an HA. Conversely, an individual is defined as having HL if they report fair or poor hearing, *or* report wearing an HA. Online supplemental appendix V lists the hearing categories used in each country, the survey questions in the original language (where possible), and our cut points used to determine HL.

Sex and gender

Inequalities in HL and HA use can be related to both sex and gender. When we use the term *sex*, we are referring to any biological characteristic, such as those related to hormone differences.[53] When we use *gender*, we are referring to any differences attributed to socially constructed identities and behaviours, such as occupational roles and healthcare utilisation.[54] Throughout the paper, we will use *gender* when describing our analyses.

In the majority of the surveys, participants were given the option of self-reporting male or female; in two surveys (CHARLS and SHARE), the interviewer recorded whether the participant was male or female. It is important to note that there may be cultural or linguistic differences in our interpretation of the question about sex/gender because we have referred to the English translation of questionnaires made available by each study team.

Statistical analysis

We calculated a standard population by estimating the mean age distribution by 5-year age groups and sex for ages 50–85+ across our included countries (except Costa Rica) for the year 2020 from the United Nations World Population Prospects.[55] Costa Rica was not included in this standardised population because the survey only includes participants aged 60 years and older. Using this standard population, we calculated the age-standardised prevalence of HL, HA use and the gender ratio for each country/region.

We calculated the age-specific prevalence of HL and HA use by gender for each country/region for 5-year age groups from age 50 to 85+ with 95% confidence intervals (95% CI). We grouped certain countries from SHARE into regions (eg, Northern Europe) for ease of interpretation. To understand better the gender disparities within and between countries, we computed two men:women ratios: first, the gender ratio of the prevalence of HL and second, the gender ratio of the prevalence of HA-users among individuals with HL. All statistical analyses were conducted using RStudio version 4.2.0.

RESULTS

Sample characteristics are given in online supplemental appendix VI. The number of observations range from 1003 in Ireland (grouped into Western Europe) to 183 063 in the USA. The mean age for both men and women in all surveys falls in the 60s, with the exception of Costa Rica (where respondents are older, given the higher minimum age for participation).

Figure 1 presents ranked age-standardised prevalence of HL in the general population and HA use among those with HL. The prevalence of HL ranges widely across countries. The greatest prevalence of HL is reported in China (65.2%), while the lowest prevalence is observed in South

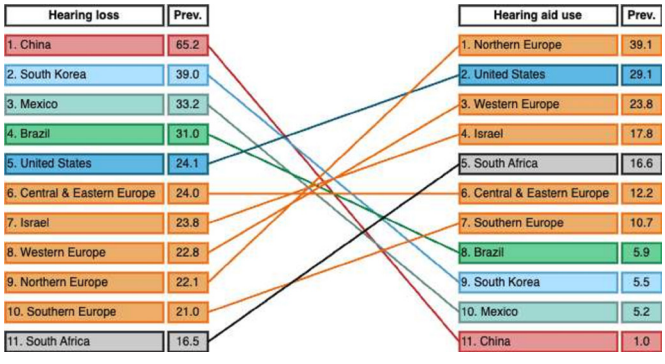
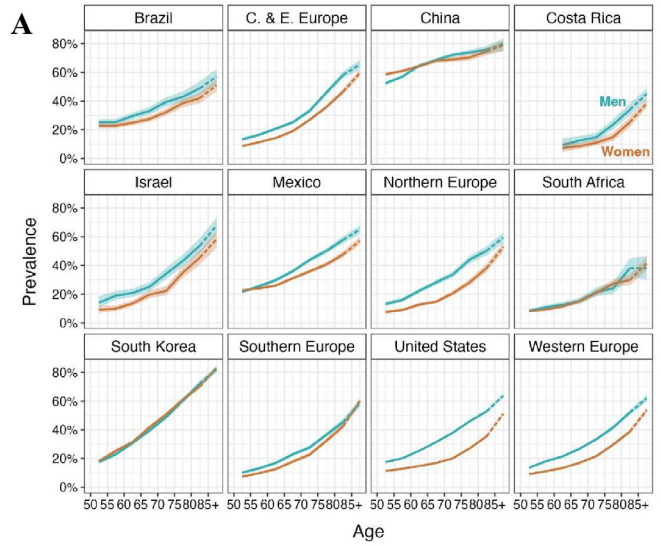


Figure 1 Country ranking of the age-standardized prevalence of hearing loss and hearing aid use among people with hearing loss. Colours denote the different surveys.



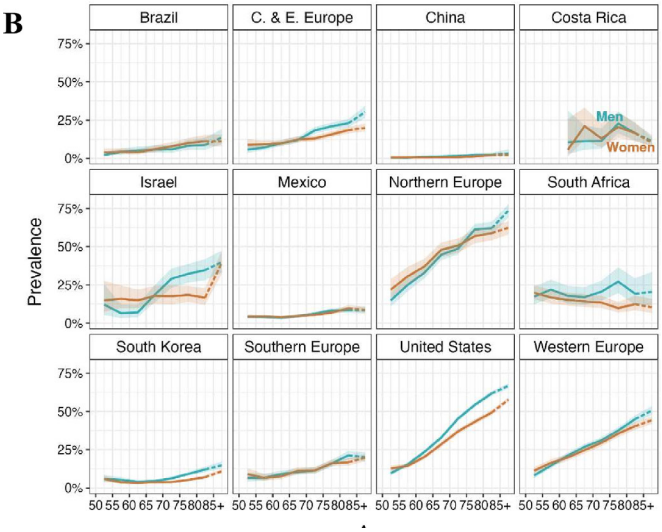


Figure 2 Age-specific prevalence of hearing loss (A) and hearing aid use among individuals with hearing loss (B), for men and women by country/region. Shaded areas represent 95% CI. Dashed line indicates the open-ended age interval 85+ whereas the solid line indicates 5-year age groups (eg, 50–54 years). Estimates for each group are plotted at the midpoint (eg, 52.5 years). C. & E. Europe, Central and Eastern Europe.

Africa (16.5%). The four countries with the greatest HL (China, South Korea, Mexico, Brazil) also exhibit the lowest levels of HA use (ranging from 1.0% of those with HL in China to 5.9% in Brazil). In contrast, adults with HL in Northern Europe, the USA and Western Europe are most likely to report using an HA (ranging from 23.8% in Western Europe to 39.1% in Northern Europe).

Figure 2 explores patterns in prevalence by age and gender (with 95% CI). In figure 2A, the likelihood of HL increases with age in all countries, though exact levels vary internationally. HL at the oldest ages is least reported in Costa Rica and South Africa, where prevalence barely rises above 40% at ages 85+. In contrast, over 50% of 50- to 54-year-olds in China report HL, with 80% doing so at the oldest ages. With the exceptions of China,

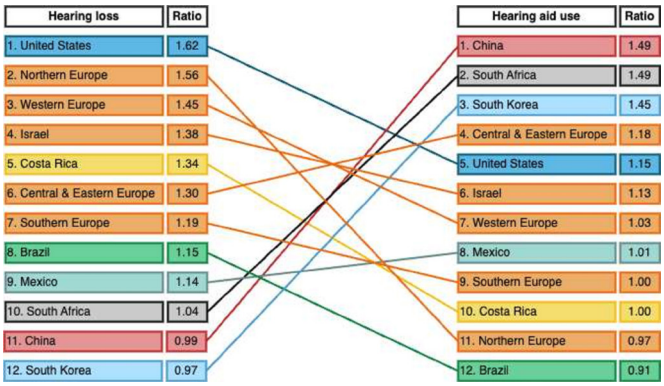


Figure 3 Country ranking of the age-standardized gender ratio (men:women) of hearing loss and hearing aid use among people with hearing loss. Higher ranks indicate larger values for males. Colours denote the different surveys.

South Korea and South Africa, men are significantly more likely than women to report HL at nearly all ages (later explored in figures 3 and 4, below).

Figure 2B illustrates international differences in HA use in overall levels, age patterns and gender differences. In the highest use regions (Northern Europe, USA, Western Europe), HA use increases linearly with age. In Northern Europe, for example, roughly 13% of 50- to 54-year-old men with HL use HAs, compared with 73.8% at ages 85+. While less pronounced, increasing use with age is also evident in other regions (other parts of Europe, Brazil, South Korea), although overall levels remain low, even at the oldest ages. In South Africa, the age pattern is reversed. Both older men and older women are *less* likely

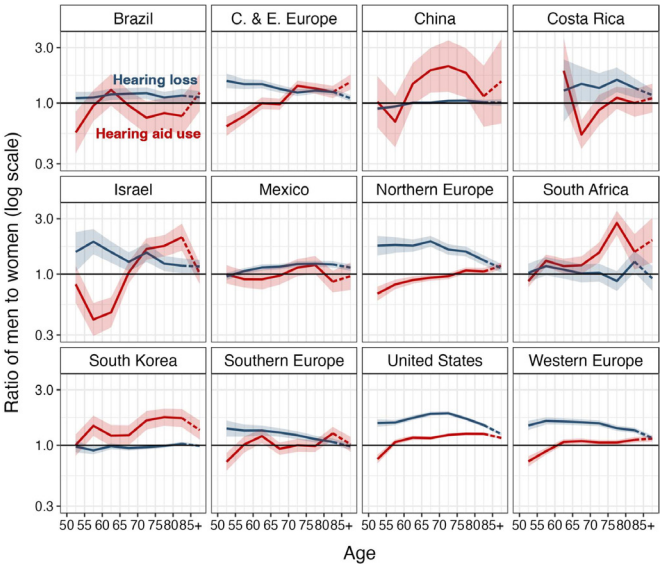


Figure 4 Gender ratio of age-specific hearing loss and hearing aid use (among those with hearing loss) by country/region. Values above 1.0 indicate men report more than women. Shaded areas represent 95% CI. The dashed line indicates the open-ended age interval 85+ whereas the solid line indicates 5-year age groups (eg, 50–54 years). Estimates for each group are plotted at the midpoint (eg, 52.5 years). C. & E. Europe, Central and Eastern Europe.

to report HA use than their younger counterparts. HL and HA-use prevalence plots from individual SHARE countries can be seen in online supplemental appendix VII.

Figure 3 presents ranked ratios of gender differences in age-standardised HL and HA use. A ratio above 1 indicates higher rates for men relative to women, while a ratio below 1 indicates higher rates for women. HL differences between men and women are greatest in the USA, where men are 1.6 times more likely to report HL than women. Meanwhile, South Africa, China and South Korea report little to no gender differences in HL.

South Africa, China and South Korea also report the greatest male advantage in HA use; men here are 1.5 times more likely to use an HA (though overall use in China and South Korea is extremely low). In contrast, women in Brazil and Northern Europe are *more* likely than men to use HAs, while gender differences are small or non-existent in Southern Europe, Costa Rica, Mexico and Western Europe.

Figure 4 further explores age patterns in these gender differences, with values above 1 again representing higher rates for men (and 95% CI bands that indicate statistical significance if they do not include one). Gender differences in HL (blue lines) are generally larger at younger ages. In regions with the largest gender differences (USA, Northern Europe, Western Europe), men below age 70 are up to two times more likely to report HL than women. Here, and in other regions with smaller but still statistically significant gender differences (Brazil, Israel, Costa Rica, other regions in Europe and Mexico), differences diminish with age. In contrast, there are little to no sex differences in HL at any age in China, South Africa and South Korea.

The red lines in figure 4 illustrate gender differences in HA use. In areas with high HA use (Northern Europe, USA, Western Europe and Israel), younger women are more likely to use HAs than younger men (the opposite is true at older ages). In mid-use regions (Costa Rica, Central and Eastern Europe and Southern Europe), gender differences are inconsistent across age. Though use is low or rare in South Africa, South Korea and China, men of nearly all ages are consistently and significantly more likely to use the technology than women.

DISCUSSION

Results from the current study highlight the heterogeneity of HL and HA use prevalence by age and gender among a diverse group of countries. Though results are wide-ranging, several patterns emerge. The four countries with the highest reported levels of HL (China, South Korea, Mexico and Brazil) are also those with the lowest reported HA use. While men are more likely to report HL in nearly all countries, China and South Korea stand out for their lack of gender differences. In contrast, men in the USA, Northern Europe and Western Europe are most likely to report HL relative to women. In most regions, gender differences in HL decrease with age, as HL increases. Similar to HL, HA use increases with age in most countries (with the notable exception of South Africa, where use decreases with age). Together, our results underscore the wide-ranging contribution of country and gender contexts in producing self-reports of HL and HA use. Large international variation in prevalence, and gender differences therein, suggests complex processes at play.

Prevalence

The wide range in self-reported HL, from 17% in South Africa to 65% in China, suggests complex interactions between a country's structural factors, like medical and educational systems, and a host of socio-cultural elements, such as beliefs around stigma, disability and gender norms. The role of structural systems may be especially pertinent for LMICs, whose health systems are still developing and where specialty services, such as audiology, have only been recently established (audiology is still not a recognised profession in China).[56] For example, in South Africa, the public health system is underfunded and overburdened, so individuals have difficulty accessing affordable services and may delay seeking help or turn to expensive private care as a last resort.[57]

To understand the high prevalence of self-reported HL in China and South Korea (consistent with previous research[16 58]), it may be useful to consider a cultural perspective. For example, research has shown that HL can be viewed as a sign of divine punishment[59 60] or a penalty for past sins.[61] In China's Confucian tradition, disability is viewed as disorderly, irregular and improper, while the Buddhist doctrine of karma can lead disability to be viewed as a punishment for past sins.[62] While we might expect that this stigma associated with HL would lead individuals to self-report better hearing, it may be that people underreport their condition to healthcare professionals but are more willing to acknowledge it on anonymous surveys.

Another possible explanation is that cultural differences in the role of the family may influence older adults' willingness to acknowledge their HL. For example, prior research has shown that Hispanic individuals reap health benefits from their family-centred culture, which can buffer older adults against loneliness and stress.[63 64] Strong family bonds and an emphasis on mutual care might make older adults more open about their health conditions.[65]

The countries examined in the current study represent a mix of healthcare systems. Although differing financial barriers appear to explain some disparities in HL use within countries, pinpointing the correlation between access and uptake at the international level is complicated. We find that even in countries with complete or near-complete insurance coverage (eg, Western Europe, Northern Europe), HA uptake remains well below 100%, suggesting that financial access can only tell some of the

story. For example, in Iceland, HAs are fully covered by the national insurance programme, yet only 23% of eligible Icelandic men and 16% of eligible Icelandic women use HAs.[66] Brazil also offers full coverage of basic HAs,[67] yet we find extremely low usage. China covers the cost of older adults' access,[68] yet we find no increasing use with age. Covered devices may not be of good enough quality,[68] or reasons for non-use may be unrelated. In South Korea, where we also found low usage, the number one reason for non-use among hard-of-hearing adults was the feeling that hearing levels are adequate, followed distantly by the inability to afford an HA and the perception that HAs are uncomfortable.[69]

In addition to reflecting variation in access to HAs, the low prevalence of HA use in many countries (particularly in China and South Korea) may reflect cultural differences in the perception of ageing. For example, in Chinese culture, the values of filial piety and veneration for the old may lead older Chinese adults to believe that since HL is a natural part of the ageing process, those around them should adapt rather than expect the older adult to change or seek help for their HL.[56] Moreover, older adults who rely on traditional medicine have noted a preference for a cure for HL over HA adoption and therefore tend to opt for alternative treatments, including Chinese medicine or acupuncture, instead of seeking HAs.[56]

Of course, we cannot ignore the possibility that linguistic differences across surveys may lead to data artefacts. Online supplemental appendix VIII shows the detailed distribution of hearing-status responses across surveys. Of note, nearly half of respondents in China's CHARLS survey reported 'fair' hearing, more than in any other survey. Because our study, consistent with previous research on self-reported hearing in China,[58] classifies both fair and poor hearing as hearing loss, China's high levels of self-reported hearing loss may be due to translation issues between English and Chinese, such as for the Chinese character used for 'fair'. The possibility of China's high prevalence actually being a data artefact (and how to best address that in international comparisons) is an important question for future research.

Gender differences

Our findings are broadly consistent with prior research showing that men have a greater prevalence of HL compared with women in the USA,[19 20] Europe,[21] Mexico,[16] Brazil[70] and Costa Rica.[71] Gender differences in HL tend to diminish with age, possibly reflecting earlier onset of HL for men.[72] In contrast, we find little to no gender differences in HL in South Africa, China and South Korea. Data on HL prevalence is particularly limited in South Africa, but prior evidence suggests a lack of gender differences.[73]

Our results conflict with studies using objective measures of HL that have shown a greater prevalence of HL in men compared with women in China[74 75] and South Korea.[76] However, a study using self-reported HL data also found no significant gender difference in HL in South Korea,[16] and another using objective measures found that while being a man was associated with the incidence of HL, it was not associated with deterioration of hearing over time.[77]

Our finding that women in high HA-use countries (like the USA and parts of Europe) tend to be heavier HA-users than men at younger ages highlights the importance of conducting research at the intersection of age, gender and hearing status. Research on the role of age for 'the hearing aid effect', or associating negative attributes to people who wear HAs,[78] has yielded inconsistent results. One study using picture rating tasks to measure how participants perceive individuals who wear HAs found that both children and adults perceived children wearing HAs to be less athletic, confident or healthy,[79] while another study did not find significant HA effects for perceived attractiveness, intelligence or age by participant age group (older adult mean age 70 years, younger adult mean age 23 years).[80]

Moreover, a research study on women in three age groups (34–45; 55–65; 75–85) with age-normal hearing found that younger women held more negative perceptions (greater stigma) toward HA use than older women.[81] Other research has shown that women in the USA tend to seek help earlier after perceiving a hearing problem,[82] are more likely to disclose a diagnosed HL to peers[83] and adopt HAs sooner after candidacy than men,[84] consistent with our finding that younger US women are more likely HA-users.

While we find that women in countries with relatively high HA use tend to adopt HAs earlier than men, men in low HA use regions such as China, South Korea and South Africa tend to be the predominant HA users at all ages. It is possible that this pattern of results reflects known gender disparities in access to information and technology.[85] This disparity is particularly evident in healthcare, where men are more likely to benefit from advanced medical treatments and technologies sooner than women. For example, women in China receive advanced cardiac treatments and interventions less frequently than men,[86] and men are often prioritised for newer and more effective diagnostic tools.[87] In South Korea, older men tend to have higher digital literacy compared with older women, which makes men more adept at adopting new technologies.[88] In South Africa, the fragmented and uncoordinated science and technology system, inherited from the apartheid era, has had an impact on the equitable distribution of technological advancement, with women being underrepresented in science and technology fields and having less access to new technologies.[89] South Africa also stands out as the only country in which younger adults are more likely than their older counterparts to report using HAs, possibly suggesting disuse among older adults previously fitted with an HA.[90]

Strengths and limitations

This study has several strengths, including its wide coverage of countries from different regions and income levels, allowing us to identify patterns both within and between many different contexts. Additionally, focusing on cross-national gender differences adds a novel perspective to existing literature on HL and HA use and highlights the importance of considering cultural and structural factors in hearing health.

However, findings from the current study should be considered in light of several limitations. First, hearing function and HA use were self-reported measures. While pure-tone audiometry is considered the gold standard for clinically assessing hearing sensitivity,[91] research also indicates that it may not fully capture the real-world experience of hearing disability.[92] This is particularly evident in situations involving an individual's reported listening comprehension during group conversations[93] or in noisy environments.[94] Moreover, self-reported data on hearing have been identified as one means for assessing disease burden in regions with insufficient access to audiometric technologies and audiologists.[14 15] Finally, a meta-analysis suggests that though findings using self-reported data were more heterogenous than audiometric studies, effect sizes between the groups were similar.[95]

Second, while our study encompasses a diverse array of countries, it is limited to those classified as upper middle-income to high-income. Consequently, we are unable to extrapolate our findings to low or lower-middle income countries, leaving a gap in understanding the patterns that may emerge in these contexts. The current study thus highlights the need for better data collection on HL and HA use in order to inform future research in these settings.

Third, as the current study was intended to be descriptive in nature rather than explanatory, we cannot make claims about the mediating factors that may produce international differences.

Fourth, the surveys used in our analyses varied in terms of time periods covered (eg, ELSI-Brazil, 2016–2020 vs CRELES, 2005–2009). However, we found no evidence of time trends (online supplemental appendix IX).

Finally, we cannot rule out bias introduced by international reporting differences due to survey differences (in number of hearing loss categories, for example) or in linguistic/cultural interpretation of the categories. While any such bias may influence international differences in prevalences, they likely have minimal influence on international differences in gender ratios as both men and women complete the same survey within a country.

Future directions

The findings of the current study highlight myriad avenues for future research, including an accounting of the elements that produce international differences. Another promising area for future research is a deeper exploration of countries with high levels of self-reported HL and low HA use, like China, South Korea and South Africa. If HA use in these countries is low for structural reasons, and not because adults with HL do not wish to use HAs, these areas may be fruitful for improving HA uptake. However, any processes looking to increase HA use should be mindful of the emerging pattern of gender inequality in HA use in low-use areas.

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REFERENCES

1 Nieman CL, Marrone N, Mamo SK, *et al*. The Baltimore HEARS Pilot Study: An Affordable, Accessible, Community-Delivered Hearing Care Intervention. *Gerontologist* 2017;57:1173–86.
2 Wilson BS, Tucci DL, Merson MH, *et al*. Global hearing health care: new findings and perspectives. *Lancet* 2017;390:2503–15.
3 PCAST. Aging America & hearing loss: imperative of improved hearing technologies. President's Council of Advisors on Science and Technology; 2015. Available: https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/PCAST/pcast_hearing_tech_letterreport_final.pdf
4 NASEM. *Hearing Health Care for Adults: priorities for Improving Access and Affordability*. National Academies Press, 2016.
5 Wilson BS, Tucci DL, O'Donoghue GM, *et al*. A Lancet Commission to address the global burden of hearing loss. *Lancet* 2019;393:2106–8.
6 World Health Organization. World report on hearing: executive summary. World Health Organization; 2021. Available: https://cdn.who.int/media/docs/default-source/documents/health-topics/deafness-and-hearing-loss/world-report-on-hearing/wrh-executive-summary.en.pdf
7 Contrera KJ, Betz J, Genther DJ, *et al*. Association of Hearing Impairment and Mortality in the National Health and Nutrition Examination Survey. *JAMA Otolaryngol Head Neck Surg* 2015;141:944–6.
8 Riska KM, Peskoe SB, Kuchibhatla M, *et al*. Impact of Hearing Aid Use on Falls and Falls-Related Injury: Results From the Health and Retirement Study. *Ear Hear* 2022;43:487–94.
9 Huang RJ, Riska KM, Gordee A, *et al*. The Association Between Hearing Loss and Surgical Complications in Older Adults. *Ear Hear* 2022;43:961–71.
10 Shukla A, Harper M, Pedersen E, *et al*. Hearing Loss, Loneliness, and Social Isolation: A Systematic Review. *Otolaryngol Head Neck Surg* 2020;162:622–33.
11 West JS. Hearing impairment, social support, and depressive symptoms among U.S. adults: a test of the stress process paradigm. *Soc Sci Med* 2017;192:94–101.
12 Tan CJ-W, Koh JWT, Tan BKJ, *et al*. Association Between Hearing Loss and Cardiovascular Disease: A Meta-analysis. *Otolaryngol Head Neck Surg* 2024;170:694–707.
13 Livingston G, Huntley J, Liu KY, *et al*. Dementia prevention, intervention, and care: 2024 report of the Lancet standing Commission. *Lancet* 2024;404:572–628.
14 Haile LM, Kamenov K, Briant PS, *et al*. Hearing loss prevalence and years lived with disability, 1990–2019: findings from the Global Burden of Disease Study 2019. *The Lancet* 2021;397:996–1009.
15 Waterworth CJ, Marella M, O'Donovan J, *et al*. Barriers to access to ear and hearing care services in low- and middle- income countries: A scoping review. *Glob Public Health* 2022;17:3869–93.
16 Burns SD, West JS. Country Differences in Older Men's Hearing Difficulty Disadvantage. *J Aging Health* 2025;37:356–67.
17 Mitchell P, Gopinath B, Wang JJ, *et al*. Five-year incidence and progression of hearing impairment in an older population. *Ear Hear* 2011;32:251–7.
18 Mick PT, Hämäläinen A, Kolisang L, *et al*. The Prevalence of Hearing, Vision, and Dual Sensory Loss in Older Canadians: An Analysis of Data from the Canadian Longitudinal Study on Aging. *Can J Aging* 2021;40:1–22.
19 Hoffman HJ, Dobie RA, Losonczy KG, *et al*. Kids Nowadays Hear Better Than We Did: Declining Prevalence of Hearing Loss in US Youth, 1966-2010. *Laryngoscope* 2019;129:1922–39.
20 Agrawal Y, Platz EA, Niparko JK. Prevalence of hearing loss and differences by demographic characteristics among US adults: data from the National Health and Nutrition Examination Survey, 1999-2004. *Arch Intern Med* 2008;168:1522–30.
21 Hansen RS, Scheel-Hincke LL, Jeune B, *et al*. Sex differences in vision and hearing impairments across age and European regions: Findings from SHARE. *Wien Klin Wochenschr* 2024;136:55–63.
22 Nolan LS. Age-related hearing loss: Why we need to think about sex as a biological variable. *J Neurosci Res* 2020;98:1705–20.
23 Shuster BZ, Depireux DA, Mong JA, *et al*. Sex differences in hearing: Probing the role of estrogen signaling. *J Acoust Soc Am* 2019;145:3656.
24 Reavis KM, Bisgaard N, Canlon B, *et al*. Sex-Linked Biology and Gender-Related Research Is Essential to Advancing Hearing Health. *Ear Hear* 2023;44:10–27.
25 Campos-Serna J, Ronda-Pérez E, Artazcoz L, *et al*. Gender inequalities in occupational health related to the unequal distribution of working and employment conditions: a systematic review. *Int J Equity Health* 2013;12:57.
26 Lie A, Skogstad M, Johannessen HA, *et al*. Occupational noise exposure and hearing: a systematic review. *Int Arch Occup Environ Health* 2016;89:351–72.
27 Themann CL, Masterson EA. Occupational noise exposure: A review of its effects, epidemiology, and impact with recommendations for reducing its burden. *J Acoust Soc Am* 2019;146:3879.
28 Eng A, 't Mannetje A, McLean D, *et al*. Gender differences in occupational exposure patterns. *Occup Environ Med* 2011;68:888–94.
29 Ralli M, Balla MP, Greco A, *et al*. Work-Related Noise Exposure in a Cohort of Patients with Chronic Tinnitus: Analysis of Demographic and Audiological Characteristics. *Int J Environ Res Public Health* 2017;14:1035.
30 Merino-Salazar P, Artazcoz L, Cornelio C, *et al*. Work and health in Latin America: results from the working conditions surveys of Colombia, Argentina, Chile, Central America and Uruguay. *Occup Environ Med* 2017;74:432–9.
31 Clausen T, Kristiansen J, Hansen JV, *et al*. Exposure to disturbing noise and risk of long-term sickness absence among office workers: a prospective analysis of register-based outcomes. *Int Arch Occup Environ Health* 2013;86:729–34.
32 Addis ME, Mahalik JR. Men, masculinity, and the contexts of help seeking. *Am Psychol* 2003;58:5–14.
33 O'Brien R, Hunt K, Hart G. 'It's caveman stuff, but that is to a certain extent how guys still operate': men's accounts of masculinity and help seeking. *Soc Sci Med* 2005;61:503–16.
34 Staiger T, Stiawa M, Mueller-Stierlin AS, *et al*. Masculinity and Help-Seeking Among Men With Depression: A Qualitative Study. *Front Psychiatry* 2020;11:599039.
35 Sagar-Ouriaghli I, Brown JSL, Tailor V, *et al*. Engaging male students with mental health support: a qualitative focus group study. *BMC Public Health* 2020;20:1159.
36 Yin H, Wardenaar KJ, Xu G, *et al*. Help-seeking behaviors among Chinese people with mental disorders: a cross-sectional study. *BMC Psychiatry* 2019;19:373.
37 Hay K, McDougal L, Percival V, *et al*. Disrupting gender norms in health systems: making the case for change. *Lancet* 2019;393:2535–49.
38 Garstecki DC, Erler SF. Personal and social conditions potentially influencing women's hearing loss management. *Am J Audiol* 2001;10:78–90.
39 Morgan R, Ayiasi RM, Barman D, *et al*. Gendered health systems: evidence from low- and middle-income countries. *Health Res Policy Syst* 2018;16:58.
40 Yeo BSY, Song HJJMD, Toh EMS, *et al*. Association of Hearing Aids and Cochlear Implants With Cognitive Decline and Dementia: A Systematic Review and Meta-analysis. *JAMA Neurol* 2023;80:134–41.
41 Choi JS, Adams ME, Crimmins EM, *et al*. Association between hearing aid use and mortality in adults with hearing loss in the USA: a mortality follow-up study of a cross-sectional cohort. *Lancet Healthy Longev* 2024;5:e66–75.
42 Lima-Costa MF, de Melo Mambrini JV, Bof de Andrade F, *et al*. Cohort Profile: The Brazilian Longitudinal Study of Ageing (ELSI-Brazil). *Int J Epidemiol* 2023;52:e57–65.
43 Zhao Y, Hu Y, Smith JP, *et al*. Cohort profile: the China Health and Retirement Longitudinal Study (CHARLS). *Int J Epidemiol* 2014;43:61–8.
44 Rosero-Bixby L, Dow WH, Fernández X. CRELES: Costa Rican longevity and healthy aging study. Methods, wave 1. 2013. Available: http://www.creles.berkeley.edu
45 Wong R, Michaels-Obregon A, Palloni A. Cohort Profile: The Mexican Health and Aging Study (MHAS). *Int J Epidemiol* 2017;46:e2.
46 Jang SN. Korean longitudinal study of ageing (KLOSA): overview of research design and contents. In: Pachana NA, ed. *Encyclopedia of geropsychology*. Singapore: Springer, 2016: 1–9.

47 Sonnega A, Faul JD, Ofstedal MB, *et al*. Cohort Profile: the Health and Retirement Study (HRS). *Int J Epidemiol* 2014;43:576–85.
48 Börsch-Supan A, Brandt M, Hunkler C, *et al*. Data Resource Profile: The Survey of Health, Ageing and Retirement in Europe (SHARE). *Int J Epidemiol* 2013;42:992–1001.
49 Ahrenfeldt LJ, Möller S, Thinggaard M, *et al*. Sex Differences in Comorbidity and Frailty in Europe. *Int J Public Health* 2019;64:1025–36.
50 Ahrenfeldt LJ, Scheel-Hincke LL, Kjærgaard S, *et al*. Gender differences in cognitive function and grip strength: a cross-national comparison of four European regions. *Eur J Public Health* 2019;29:667–74.
51 Lee J, Phillips D, Wilkens J, *et al*. Gateway to Global Aging Data: Resources for Cross-National Comparisons of Family, Social Environment, and Healthy Aging. *J Gerontol B Psychol Sci Soc Sci* 2021;76:S5–16.
52 Gómez-Olivé FX, Montana L, Wagner RG, *et al*. Cohort Profile: Health and Ageing in Africa: A Longitudinal Study of an INDEPTH Community in South Africa (HAALSI). *Int J Epidemiol* 2018;47:689–690j.
53 Horiuchi S. Postmenopausal acceleration of age-related mortality increase. *J Gerontol A Biol Sci Med Sci* 1997;52:B78–92.
54 Rieker PP, Bird CE. Rethinking Gender Differences in Health: Why We Need to Integrate Social and Biological Perspectives. *J Gerontol B Psychol Sci Soc Sci* 2005;60:S40–7.
55 United Nations Population Division, Department of Economic and Social Affairs. World population prospects: the 2022 revision, custom data acquired via website. 2022. Available: https://population.un.org/wpp/ [Accessed 19 Oct 2022].
56 Zheng H, Wong LLN, Hickson L. Barriers to hearing aid adoption among older adults in mainland China. *Int J Audiol* 2023;62:814–25.
57 Mtimkulu TK, Khoza-Shangase K, Petrocchi-Bartal L. Barriers and facilitators influencing hearing help-seeking behaviors for adults in a peri-urban community in South Africa: a preventive audiology study. *Front Public Health* 2023;11:1095090.
58 Heine C, Browning CJ, Gong CH. Sensory Loss in China: Prevalence, Use of Aids, and Impacts on Social Participation. *Front Public Health* 2019;7:5.
59 Ebrahimi H, Mohammadi E, Mohammadi MA, *et al*. Stigma in mothers of deaf children. *Iran J Otorhinolaryngol* 2015;27:109–18.
60 Franks JR, Beckmann NJ. Rejection of hearing aids: attitudes of a geriatric sample. *Ear Hear* 1985;6:161–6.
61 Gilbey P. Qualitative analysis of parents' experience with receiving the news of the detection of their child's hearing loss. *Int J Pediatr Otorhinolaryngol* 2010;74:265–70.
62 Christensen B. On the fringe: China's disability laws through the lens of the traditional culture. *BYU Asian Studies Journal* 2014;4.
63 Corona K, Campos B, Chen C. Familism is associated with psychological well-being and physical health: main effects and stress-buffering effects. *Hisp J Behav Sci* 2017;39:46–65.
64 Markides KS, Rote S. The Healthy Immigrant Effect and Aging in the United States and Other Western Countries. *Gerontologist* 2019;59:205–14.
65 Valdivieso-Mora E, Peet CL, Garnier-Villarreal M, *et al*. A Systematic Review of the Relationship between Familism and Mental Health Outcomes in Latino Population. *Front Psychol* 2016;7:1632.
66 Fisher DE, Li C-M, Hoffman HJ, *et al*. Sex-specific predictors of hearing-aid use in older persons: the age, gene/environment susceptibility - Reykjavik study. *Int J Audiol* 2015;54:634–41.
67 Tikkanen R, Osborn R, Mossialos E, *et al*. International health care systems profiles: Brazil. 2020. Available: https://www.commonwealthfund.org/international-health-policy-center/countries/brazil [Accessed 21 Apr 2025].
68 Yong M, Willink A, McMahon C, *et al*. Access to adults' hearing aids: policies and technologies used in eight countries. *Bull World Health Organ* 2019;97:699–710.
69 Cho YS, Kim G-Y, Choi JH, *et al*. Factors Influencing Hearing Aid Adoption in Patients With Hearing Loss in Korea. *J Korean Med Sci* 2021;37:e11.
70 Barbosa MG, Oliveira D, Martinelli MC, *et al*. The association of hearing loss with depressive symptoms and cognitive function among older people: Results from the Brazilian Longitudinal Study of Aging. *Int J Geriatr Psychiatry* 2023;38:e5904.
71 Berlinski S, Duryea S, Perez-Vincent SM. Prevalence and correlates of disability in Latin America and the Caribbean: Evidence from 8 national censuses. *PLoS ONE* 2021;16:e0258825.
72 Goman AM, Lin FR. Prevalence of Hearing Loss by Severity in the United States. *Am J Public Health* 2016;106:1820–2.
73 Louw C, Swanepoel DW, Eikelboom RH, *et al*. Prevalence of hearing loss at primary health care clinics in South Africa. *Afr Health Sci* 2018;18:313–20.
74 Wang Y, Chong–ling Y, Shi–wen X, *et al*. A Report of WHO Ear and Hearing Disorders Survey in Guizhou Province. *J Otol* 2010;5:61–7.
75 Bu X, Liu C, Xing G, *et al*. WHO Ear and Hearing Disorders Survey in four provinces in China. *Audiol Med* 2011;9:141–6.
76 Jun HJ, Hwang SY, Lee SH, *et al*. The prevalence of hearing loss in South Korea: data from a population-based study. *Laryngoscope* 2015;125:690–4.
77 Oh KH, Cho H, Lee SK, *et al*. Characteristics of Hearing Loss Among Older Adults in the Korean Genome and Epidemiology Study: A Community-Based Longitudinal Cohort Study With an 8-Year Follow-up. *Clin Exp Otorhinolaryngol* 2023;16:132–40.
78 Blood GW, Blood IM, Danhauer JL. The hearing aid effect. *Hearing Instruments* 1977;28.
79 Qian ZJ, Nuyen BA, Kandathil CK, *et al*. Social Perceptions of Pediatric Hearing Aids. *Laryngoscope* 2021;131:E2387–92.
80 Beadle J, Jenstad L, Cochrane D, *et al*. Perceptions of older and younger adults who wear hearing aids. *Int J Audiol* 2024;63:957–65.
81 Erler SF, Garstecki DC. Hearing loss- and hearing aid-related stigma: perceptions of women with age-normal hearing. *Am J Audiol* 2002;11:83–91.
82 Humes LE, Ahlstrom JB, Bratt GW, *et al*. Studies of Hearing-Aid Outcome Measures in Older Adults: A Comparison of Technologies and an Examination of Individual Differences. *Semin Hear* 2009;30:112–28.
83 West JS, Low JCM, Stankovic KM. Revealing Hearing Loss: A Survey of How People Verbally Disclose Their Hearing Loss. *Ear Hear* 2016;37:194–205.
84 Simpson AN, Matthews LJ, Cassarly C, *et al*. Time From Hearing Aid Candidacy to Hearing Aid Adoption: A Longitudinal Cohort Study. *Ear Hear* 2019;40:468–76.
85 Qazi A, Hasan N, Abayomi-Alli O, *et al*. Gender differences in information and communication technology use & skills: a systematic review and meta-analysis. *Educ Inf Technol* 2022;27:4225–58.
86 Hao Y, Liu J, Liu J, *et al*. Sex Differences in In-Hospital Management and Outcomes of Patients With Acute Coronary Syndrome. *Circulation* 2019;139:1776–85.
87 Cao S. Chinese masculinities, identity formation and cultural values. In: Cao S, ed. *Chinese men's practices of intimacy, embodiment and kinship: crafting elastic masculinity*. Policy Press, 2021.
88 Choi JY, Lee MJ. Household type, gender, and digital literacy among older adults in South Korea. *Univ Access Inf Soc* 2025;24:425–33.
89 Kraemer-Mbula E, Maharajh R. Innovation and technological change in South Africa. In: Oqubay A, Tregenna F, Valodia I, eds. *The Oxford handbook of the South African economy*. Oxford University Press, 2021.
90 Moroe N, Vazzana N. The disuse of hearing aids in elderly people diagnosed with a presbycusis at an old age home, in Johannesburg, South Africa: a pilot study. *Afr Health Sci* 2019;19:2183–8.
91 West JS, Smith SL, Dupre ME. Hearing loss. In: Gu D, Dupre ME, eds. *Encyclopedia of gerontology and population aging*. Springer International Publishing, 2020: 1–11.
92 Demeester K, Topsakal V, Hendrickx J-J, *et al*. Hearing disability measured by the speech, spatial, and qualities of hearing scale in clinically normal-hearing and hearing-impaired middle-aged persons, and disability screening by means of a reduced SSQ (the SSQ5). *Ear Hear* 2012;33:615–6.
93 Gatehouse S, Noble W. The Speech, Spatial and Qualities of Hearing Scale (SSQ). *Int J Audiol* 2004;43:85–99.
94 Kramer SE, Kapteyn TS, Festen JM, *et al*. The relationships between self-reported hearing disability and measures of auditory disability. *Audiology* 1996;35:277–87.
95 Tan BKJ, Ng FYC, Song H, *et al*. Associations of Hearing Loss and Dual Sensory Loss With Mortality: A Systematic Review, Meta-analysis, and Meta-regression of 26 Observational Studies With 1 213 756 Participants. *JAMA Otolaryngol Head Neck Surg* 2022;148:220–34.