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Mapping Global Research Trends on Noise-Induced Hearing Loss in Fishermen: A Bibliometric Analysis from a Behavioral Perspective

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Abstract

Noise-induced hearing loss (NIHL) represents a critical occupational health challenge globally, affecting millions of workers across diverse sectors, yet it remains inadequately studied within maritime fishing communities. Despite extensive research in industrial and military contexts, the behavioral dimensions of NIHL among fishermen remain substantially underexplored in the scientific literature. This study aims to map the development of scientific trends on noise-induced hearing loss (NIHL) among fishermen, with a particular focus on behavioral perspectives, using a bibliometric analysis approach. The analysis was conducted on 1,000 scientific publications indexed between 2021 and 2025, sourced from Crossref and Publish or Perish. Bibliometric methods were employed to identify publication trends, prolific authors, leading journals, major publishers, document types, thematic keywords, and patterns of author collaboration. The findings indicate that although NIHL has been widely studied, research has predominantly concentrated on medical approaches and formal sector contexts such as industry and the military. In contrast, behavioral dimensions and occupational contexts specific to fishermen remain underexplored. The study also found that most publications appeared in specialist audiology journals managed by major publishers such as Elsevier and Springer. This study concludes that a significant gap exists in the global literature regarding NIHL in fishermen, underscoring the need for interdisciplinary approaches that integrate behavioral work perspectives. The findings serve as an initial contribution toward strengthening context-specific and community-based approaches in the study of hearing disorders caused by occupational noise exposure.

Keywords: noise-induced hearing loss, fishermen, work behavior, bibliometric analysis, occupational health

INTRODUCTION

Noise-Induced Hearing Loss (NIHL) constitutes one of the most prevalent occupational diseases worldwide, affecting an estimated 466 million people globally, with 432 million adults experiencing disabling hearing loss (WHO, 2021). The economic burden is substantial, with the annual global cost of unaddressed hearing loss estimated at $750–790 billion (Chadha et al., 2021). In occupational settings, NIHL accounts for approximately 16% of disabling hearing loss in adults worldwide, making it the second most commonly reported occupational disease

after musculoskeletal disorders (Nelson et al., 2005; Lie et al., 2016). International regulatory frameworks, including the International Labour Organization (ILO) Convention No. 148 and WHO guidelines, establish 85 dB as the permissible exposure limit for an 8-hour workday, yet compliance remains inconsistent, particularly in informal and developing economy contexts (ILO, 2018; WHO, 2018).

The informal sector, which employs approximately 61% of the global workforce (ILO, 2022), faces disproportionate NIHL risk due to multiple converging factors. Workers in this sector typically exhibit low compliance with hearing protection device (HPD) use, with utilization rates ranging from 15–40% compared to 60–85% in formal industrial settings (Fauzan et al., 2023; Ernawati, 2021). Cultural factors significantly influence risk perception and protective behavior; studies indicate that traditional beliefs about masculinity, fatalism regarding occupational hazards, and community norms discourage consistent HPD use among maritime workers (Moroe & Khoza-Shangase, 2020; Zaidan Fadhlurrohman Rivlan et al., 2024). Educational attainment correlates strongly with hearing conservation practices—workers with secondary education or higher demonstrate 2.3 times greater likelihood of using ear protection compared to those with primary education only (Hargreaves et al., 2019). Furthermore, access to occupational health information remains severely limited in coastal fishing communities, where language barriers, geographic isolation, and lack of targeted health communication campaigns create substantial knowledge gaps (Khoza-Shangase, 2025; Yadav et al., 2021).

Noise-Induced Hearing Loss (NIHL) is a serious occupational health problem worldwide, particularly in the maritime sector. Fishermen are a highly vulnerable group due to their daily exposure to noise from ship engines, waves, and other work equipment. To date, research on NIHL has focused more on the industrial and military sectors, resulting in limited behavioral studies of fishermen (Yadav et al., 2021). However, work behavior, habits of using ear protection, and socioeconomic conditions play a significant role in determining the risk of hearing loss. This study used bibliometric analysis to map research trends on NIHL in fishermen, aiming to determine research developments, identify the most active researchers and institutions, uncover key themes, and examine the link between behavioral factors and NIHL. The results are expected to uncover underexplored research gaps, particularly those related to informal sector workers such as fishermen, thus providing the basis for more effective prevention strategies.

Various studies have shown that the prevalence of occupational Noise-Induced Hearing Loss (NIHL) is quite high across various sectors. As many as 41.6% of industrial workers are reported to experience NIHL (Zhou & Zhang, 2024), with a prevalence of 39.3% in Saudi Arabia (Alqahtani et al., 2025) and one in five migrant workers in Kuwait facing similar problems. In Ethiopia, the prevalence of hearing loss reached 30.9% among military personnel in the aviation sector (Derartu Hailu Ebiyo et al., 2024). Although the sector is not maritime, the environmental noise characteristics are similar, making it relevant for comparison. Similar cases have also been found in sawmills and textile factories.

The main factors influencing the high prevalence of NIHL in the maritime sector include the type of noise, both steady-state and impulse noise (Natarajan et al., 2023); the existence of migrant workers with limited access to information and low awareness of hearing protection (Hargreaves et al., 2019); long working durations; and low levels of ear protection

equipment use (Ernawati, 2021). Education and awareness raising have been shown to be effective in reducing the risk of NIHL (Moroe & Khoza-Shangase, 2020). Noise exposure in the marine sector often exceeds the safe threshold of 85 dB set by international occupational health standards (Yadav et al., 2021). This risk is even greater if noise occurs simultaneously with exposure to other hazards such as dust (Zhou & Zhang, 2024).

In addition to environmental factors, individual factors also influence susceptibility to NIHL. Age, lifestyle, and genetic conditions contribute to accelerated hearing loss (Zhou & Zhang, 2024). Smoking and alcohol consumption have an additive effect that worsens hearing conditions (Tang et al., 2023), while genetic predisposition is beginning to receive attention in recent studies (Chen et al., 2022). Worker attitudes toward hearing protection are a crucial modifiable factor; perception of risk is directly related to compliance with hearing protection use (Fauzan et al., 2023; Zaidan Fadhlurrohman Rivlan et al., 2024). Training and counseling programs have been shown to improve worker knowledge and compliance (Musta'adah et al., 2024).

This study represents the first bibliometric analysis specifically examining NIHL in fishermen from a behavioral perspective. While previous bibliometric studies have addressed occupational health broadly (Zhu et al., 2020), industrial noise exposure (Wei et al., 2023), and general hearing loss topics (Sidhu et al., 2020), none have systematically mapped the intersection of NIHL, maritime fishing occupations, and behavioral determinants. This novel focus addresses a critical gap by synthesizing global research patterns to identify where behavioral interventions—such as health belief models, protection motivation theory, and community-based participatory approaches—have been applied or overlooked in fishing contexts. Furthermore, this study uniquely positions NIHL within the broader framework of informal sector occupational health, an area underrepresented in mainstream occupational medicine despite its relevance to billions of workers worldwide.

Bibliometric studies on NIHL are still limited (Sidhu et al., 2020), but they have proven effective in identifying research focuses, study hotspots, and opportunities for applying technology for occupational risk assessment (Wei et al., 2023). This approach is also used to examine occupational safety trends and identify research gaps that need to be addressed through an interdisciplinary approach (Alqahtani et al., 2025). Bibliometric analysis provides an empirical basis for policy recommendations and research funding priorities in the field of NIHL. Workplace-based preventive interventions have a positive impact on economic efficiency and occupational health (Arregi et al., 2024), while technological advances such as wearable devices offer innovative solutions for the prevention of hearing damage (Islam et al., 2024). International collaboration also plays an important role in expanding the reach of research and improving the quality of publications (Zhu et al., 2020). Based on these findings, this study uses a bibliometric analysis approach to map scientific publication trends related to NIHL among fishers, identify dominant researchers and institutions, uncover central themes, and explain the relationship between behavioral factors and NIHL issues. The results are expected to fill the knowledge gap, particularly in the context of informal sector workers such as fishers.

RESEARCH METHOD

This study applied a bibliometric analysis method with a descriptive-quantitative design to map and evaluate the global scientific literature on Noise-Induced Hearing Loss (NIHL) in fishermen from a behavioral perspective. Data were collected through a systematic search using Publish or Perish software version 8.17.4863.9118 connected to the Crossref database, covering scientific publications from 2021–2025. The keyword used was "noise-induced hearing loss" with the search restricted to article titles to ensure topic relevance. The research sample consisted of 1,000 publications, including journal articles, book chapters, preprints, and proceedings, with journal articles dominating at 721 publications.

The research instrument consisted of a metadata file generated from Publish or Perish, containing information such as author name, affiliation, article title, publication year, number of citations, publishing journal, and DOI. Data were then extracted and analyzed using Microsoft Excel and VOSviewer. VOSviewer was used to visualize the author collaboration network (co-authorship), keyword co-occurrence, and thematic cluster maps. The data collection procedure was carried out systematically on July 2, 2025, using a 64-bit Windows operating system, and no technical difficulties were encountered during the search process.

The analysis phase began with descriptive analysis to obtain an overview of the number of publications, annual distribution, and average citations per article, as well as identifying trends in article age based on citation distribution (citation age effect). Next, the most productive authors, top journals, and dominant publishers were identified. Visual analysis of the author collaboration network was conducted to identify key collaborative nodes such as Robert Thayer Sataloff and Katijah Khoza-Shangase. Keyword analysis was used to map thematic focus and identify research gaps, particularly related to behavioral approaches. Research validity was maintained by ensuring all documents were thematically relevant, indexed in Crossref, and had complete metadata. This approach follows the bibliometric-based occupational health research practices used by(Zhang et al., 2024),(Wei et al., 2023), And(Alqahtani et al., 2025), so that it not only presents a statistical picture, but also provides a strong empirical basis for a further research agenda on NIHL in fishermen.

RESULTS AND DISCUSSION

Research Findings

The analysis shows that the most prolific authors on the topic of Noise-Induced Hearing Loss (NIHL) are Robert Thayer Sataloff and Katijah Khoza-Shangase (16 publications each), followed by Pamela C. Roehm and Wei Qiu (12 publications). These authors are central to knowledge production and have a high level of collaboration (co-authorship). The journals with the largest contributions are Hearing Research (44 publications), Comprehensive ENT (37 publications), and Ear & Hearing (28 publications), indicating a dominance of audiology and occupational health specialist journals. The largest publishers are Elsevier BV (107 publications), Springer (98 publications), and Ovid Technologies/Wolters Kluwer Health (81 publications), followed by MDPI and Frontiers Media.

Publication types were dominated by journal articles (721 titles or >70%), followed by book chapters (121), online content (60), and proceedings (53). Frequently appearing keywords were noise-induced, occupational, workers, exposure, and medical terms such as cochlear,

sensorineural, treatment, and prevention, indicating a research focus on the work context and a clinical-physiological approach. Behavior-related terms such as behavior, awareness, and compliance rarely appeared, indicating a lack of attention to the socio-behavioral dimension.

Citation trend analysis shows an increase in citation accumulation from 2021 to 2025, with a peak in articles 3–5 years old. Several recent publications have begun to receive significant citations, indicating the continued relevance of the NIHL topic. Collaboration network visualization reveals a centralized structure, with Sataloff and Khoza-Shangase as key nodes connecting other researchers. These findings highlight that despite the rapidly expanding NIHL literature and strong international collaboration, research remains predominantly biomedical and technical. This gap opens up opportunities for behavioral-based research, particularly in underrepresented fishing communities and informal sectors in the Global South.

Discussion

Question 1: What are the global trends in scientific publications addressing occupational noise-induced hearing loss in the context of maritime and fishing occupations?

Bibliometric analysis results show a significant increase in the number of publications related to Noise-Induced Hearing Loss (NIHL) from 2021 to 2025, with the largest contributions coming from the journals Hearing Research, Comprehensive ENT, and Ear & Hearing. This aligns with the findings of(Zhang et al., 2024)who stated that although research related to work stress and occupational diseases is increasing, the use of bibliometric approaches is still limited. Data shows that 41.6% of industrial workers experience NIHL.(Zhang et al., 2024)and there are still sectoral gaps, where the maritime sector, particularly fishermen, is underrepresented. Occupational safety studies often ignore the informal sector(Alqahtani et al., 2025). Citation trends show that articles aged 3–5 years have the highest citations, supporting the findings(Moroe & Khoza-Shangase, 2020)which emphasizes the need for longitudinal data. The study(Elshaer et al., 2023)showed a prevalence of 30.9% of NIHL in the aviation sector, which has acoustic characteristics similar to the maritime sector.

Question 2: What behavioral factors are highlighted in the literature regarding hearing loss in the maritime sector?

Analysis shows that behavioral factors are rarely a primary focus, as reflected in the low occurrence of keywords such as awareness, attitude, and behavior. Yet, worker risk perception plays a significant role in the use of hearing protection devices (Fauzan et al., 2023). Training and counseling programs improve compliance with the use of protective equipment (Musta'adah et al., 2024). Dominant keywords include noise-induced, occupational, workers, and exposure, confirming the dominance of medical and technical perspectives. Lifestyle factors such as smoking and alcohol consumption exacerbate the risk of NIHL (Tang et al., 2023). Study shows that awareness and knowledge are directly proportional to changes in behavior (Zaidan Fadhlurrohman Rivlan et al., 2024). The study highlighted linguistic barriers and lack of training for maritime migrant workers (Hargreaves et al., 2019). This supports the call to integrate the local social and cultural context of work into hearing conservation strategies (Khoza-Shangase, 2025).

Question 3: Who are the dominant researchers, institutions, and countries in producing knowledge on the topic, and how do their collaboration patterns shape the existing research landscape?

Co-authorship analysis shows Katijah Khoza-Shangase and Robert Thayer Sataloff as the main collaborating nodes with 16 publications each, supporting the findings (Zhu et al., 2020) regarding the importance of international collaboration. The dominant institutions are from the United States, South Africa, and China, while developing countries with large fishing populations are underrepresented. Research tends to be concentrated in audiology and occupational health institutions, with a predominantly clinical approach (e.g., in Hearing Research and The Hearing Journal) and minimal integration of social disciplines (Arregi et al., 2024). While emphasizing the importance of investing in workplace-based prevention, socio-cultural aspects are still lacking. The dominance of publishers such as Elsevier, Springer, and Wolters Kluwer demonstrates the concentration of knowledge on paid platforms, limiting access for researchers in developing countries. This reinforces the need for open publication strategies and intersectoral approaches. (Zhang et al., 2024) which combines technology, epidemiology, and ergonomics in the study of NIHL.

Significance and Implications of the Research

This study makes an important contribution in expanding the study of Noise-Induced Hearing Loss (NIHL) through a behavioral perspective in fishing communities—a perspective that has received little attention to date. Using bibliometric methods, this study comprehensively maps knowledge, identifies thematic and geographic gaps, and emphasizes the urgency of a contextual approach as emphasized by (Khoza-Shangase, 2025) and (Moroe & Khoza-Shangase, 2020) that hearing conservation must take into account local realities and work culture.

Practically, the results of this study recommend integrating educational and behavioral approaches into informal sector occupational health programs, including culturally-based training for fishermen and awareness campaigns using local languages and participatory methods. These findings are relevant for policymakers designing occupational safety standards that are both technical and behaviorally-based, thus supporting more inclusive occupational health policies.

However, this study has limitations, including: data sources limited to Crossref and Publish or Perish, thus not covering all global publications; the quantitative-descriptive bibliometric approach; the in-depth exploration of article content; and limited author affiliation and country data that hinder detailed geographic analysis. Nevertheless, the results of this study remain a strong foundation for further research that combines bibliometrics with qualitative methods or digital ethnography to explore fishermen's perceptions and behaviors regarding occupational noise risks.

CONCLUSION

This study maps the global literature on Noise-Induced Hearing Loss (NIHL) in the maritime and fishing sectors through a bibliometric analysis of 1,000 publications (2021–2025). The results show a predominance of biomedical approaches focused on the industrial

and military sectors, while the context of fishing remains sparsely studied. Theoretically, this research expands the study of NIHL through behavioral and sociocultural perspectives, emphasizing the importance of cross-disciplinary integration. Practically, these findings provide the basis for adaptive, community-based, and culturally sensitive occupational health intervention strategies. Moving forward, mixed methods with digital ethnography or in-depth interviews, longitudinal studies to assess the sustainability of hearing education programs, and the development of open databases to expand the participation of researchers from developing countries are recommended.

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