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Knowledge, attitude, and practices towards occupational noise among maintenance and administration workers of selected health facilities in Modimolle-Mookgopong Municipality, South Africa

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ABSTRACT

This study aimed to determine knowledge, attitude, and practices towards Noise-Induced Hearing Loss among maintenance and administration workers in selected health facilities in the Modimolle-Mookgopong Municipality. Non-probability convenient sampling was used to select 250 participants. Maintenance workers were populated within the age range of 26–35 years, being more than administrative personnel (COR 1.59, CI 0.8–3.16). Maintenance workers showed more knowledge of noise being an unwanted sound (COR 1.04, CI 0.29–3.73), an ear infection (COR 4.65, CI 1.48–14.58) and poor hearing of speech as a sign of hearing loss (AOR 0.25, CI 0.07–0.86). Thirty-four percent (34%) of maintenance workers believed that ear screening and assessments are important while 17.9% believed not to be important. Forty-eight percent (58%) of maintenance workers suggested that they could not use hearing protectors effectively without training while 13.7% suggested training is needed.

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Occupational noise; Knowledge; Attitude; Practice; Health effects

Introduction

Prolonged exposure to noise above the recommended limit of 80 dB(A) is a significant workplace hazard that can cause occupational noise-induced hearing loss (NOIHL) (Verbeek et al. 2014). Apart from NOIHL, exposure to excessive noise is also linked with tinnitus, hyperacusis, hypertension (Skogstad et al. 2016), annoyance, sleeping disorders and reduced performance (Themann et al. 2013; Basner et al. 2014). Approximately, 16% of the global noise induced hearing loss (NIHL) cases in adults (Verbeek et al. 2014) accounting for 4 million DALYs are assigned to excessive noise in occupational settings (Lie et al. 2016). NOIHL can also be exacerbated by lifestyle (Pyykkö et al. 2007), individual characteristics (Lu et al. 2005), congenital or early hearing impairment (Gong and Lomax 2012) ototoxic agents (Lie et al. 2016), chronic middle ear infections, and ageing (Albera et al. 2010).

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Occupational-related illnesses such as NIHL have financial implications on organizations. For example, a worker with NIHL must be compensated, and frequently undergo audiometry tests (Mizan et al. 2014) meaning they will be absent frequently which can negatively impact the efficiency, competitiveness, and stability of the organization (International Labour Organisation 2014; Fan et al. 2020). NOIHL also has a detrimental impact on the well-being of employees and the quality of life of their families (International Labour Organisation 2014; Fan et al. 2020). As such, employers must take reasonable and practical measures to prevent exposure to excessive noise. Despite decades of research, implementation of noise control measures, and promulgation of regulations and health and safety standards, NOIHL remains a significant occupational illness globally (Nelson et al. 2005; International Labour Organisation 2014). NOIHL is a common illness in low-middle-income countries (Nelson et al. 2005) where there is a lack or fragmented occupational health and safety standards (Ncube and Kanda 2018) and low investments in exposure assessment, disease surveillance, employee wellness programmes and implementation and maintenance of control measures (Mrema et al. 2015).

The scarcity of employee wellness programmes such as noise conservation subsequently causes a lack of knowledge and information about exposure to occupational noise and preventative measures, early diagnosis, and intervention. For example, working in a noisy environment and tolerating excessive noise symbolises toughness and masculinity in many African countries, hence employees rarely use the provided hearing protective devices (HPDs). Furthermore, NOIHL is associated with witchcraft and there is a belief that it can be cured. Since cultural factors and beliefs about NIHL may impact workers' attitudes towards HPDs and their willingness to seek treatment for NIHL (Govender and Khan 2017), it is important to conduct knowledge, attitudes and practices (KAPs) studies. KAPs studies can help to identify knowledge gaps and develop interventions to improve the knowledge and attitudes of workers toward occupational noise exposure and subsequent health effects.

Although KAPs studies (e.g. Rus et al. 2008; Sayapathi et al. 2014; Zulkefli et al. 2017; Nyarubeli et al. 2020) on noise exposure have been conducted, few have focused on healthcare facilities. Studies conducted in healthcare facilities focused on healthcare practitioners, neglecting maintenance workers (MWs) who are responsible for the upkeep of medical equipment, and the environment. Subsequently, there is a dearth of literature on the KAPs of MWs in healthcare facilities regarding exposure to occupational noise, particularly in African countries such as RSA. Because of the nature of their work and the equipment used, MWs are at risk of excessive noise exposure. For example, MWs use noise-producing equipment such as lawnmowers and brush cutters that can produce excessive noise (Themann and Masterson 2019), especially if they are old and not maintained, putting them at risk of NOIHL (de Lima Andrade et al. 2021).

Given the importance of healthcare facilities in providing essential services to the public and the role of MWs, it is critical to ensure the safety and health of MWs. The objectives of this study were (i) to determine knowledge towards Noise-Induced Hearing Loss among MWs and AWs, (ii) to assess the attitude towards Noise-Induced Hearing Loss among MWs and Aws, and the use of HPDs, and (iii) to determine the relationship between the occupational characteristics and socio-demographic factors on KAPs toward occupational noise exposure. This information is crucial for identifying the gaps in the current programs and developing targeted educational interventions aimed at improving the knowledge and attitudes of MWs and AWs towards HPDs (Estill et al. 2017; Pretzsch et al. 2021).

Methods and materials

Study design

This study adopted a cross-sectional design. A cross-sectional study is an observational study that can be categorized as descriptive and analytic design (Kesmodel 2018). A cross-sectional study was suitable because it is mainly used for population-based surveys, and it is faster and cheaper to conduct which makes it feasible. The odds ratios can be derived which helps in the analysis of the study results (Zangirolami-Raimundo et al. 2018). The association between the outcomes and the exposure were calculated with the use of the odds ratio. This type of study design is helpful in the fields of public health planning and program monitoring and evaluation.

Study area

The study was conducted at the Modimolle-Mookgopong Local Municipality (MMLM), which is under the Waterberg District in Limpopo province, South Africa (Figure 1). The MMLM comprises five areas, (i) Modimolle, (ii) Mookgopong, (iii) Vaalwater, (iv) Alma, and (vi) Roedtan. According to the recent census results, MMLM has a population of 107 699 and an area of 4 685 km^2.

Study population

The study population consisted of MWs and administrative workers from nine healthcare facilities (two district hospitals and seven clinics) in the MMLM with a total of 654 permanent and contract workers. MWs which were the exposed group comprised general workers and ground workers

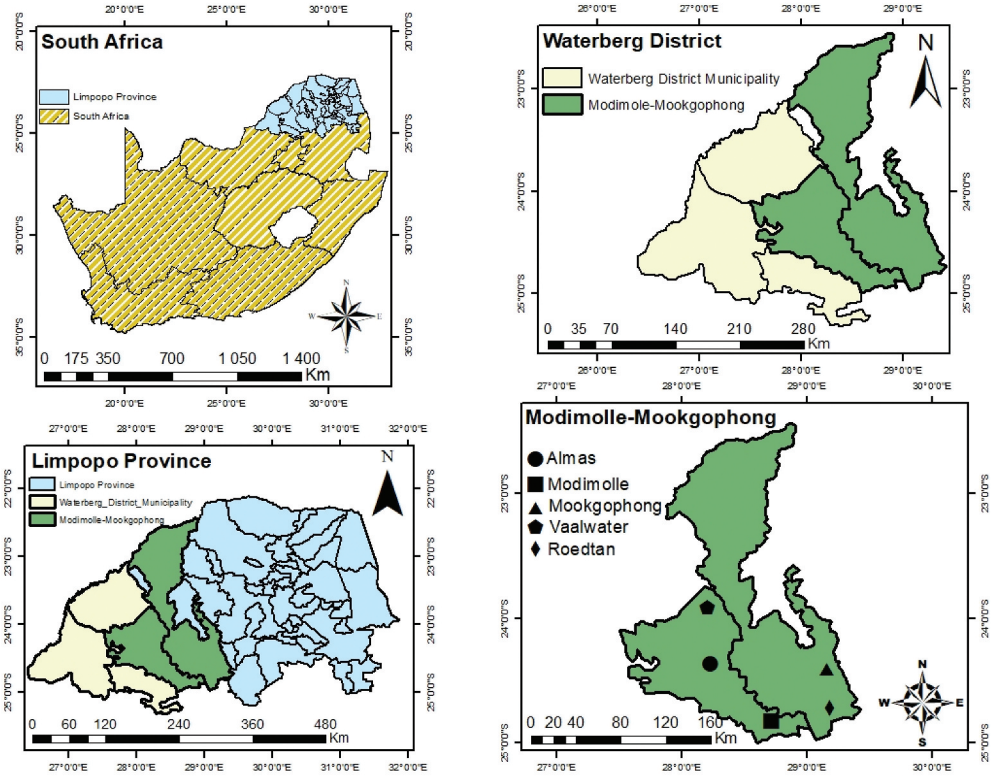

Figure 1. Geographical map of the study area. Created using ArcMap 10.8.

responsible for plumbing, welding, carpentry, and boiler making. Administrative workers (AWs) which were the control group comprised office workers in the human resource, finance, and records departments. Including the non-exposed group assisted in comparing the overall differences that existed between the two groups regarding awareness of KAPs among the workers in health facilities.

Sampling size

The sample size was calculated using Epi Info version 7.2 (Centers for Disease Control and Prevention, Atlanta, USA). The sample size was calculated using a two-sided confidence interval of 95%, and a power of 80% for a cluster of 2, which included the exposed and control groups. After adding 25% contingency for multivariate analysis, the sample size was 302 (242 + 60). The minimum possible sample size estimate using the Epi Info version 7.2 was therefore 342.

Sampling strategy and selection of participants

The study used a convenient sampling technique and applied non-probability sampling to select participants. This sampling technique collects information from the people that best suit the criteria for the study. The strategy was chosen based on its easy accessibility, and participants were readily available. This made the study more feasible and cost-effective. The participants were homogenous in a larger area as the same policies were used in all health facilities across a larger area. This study used a convenient method to select participants. Participants were chosen based on (i) work exposure in health facilities, (ii) availability and ease of access, and (iii) MWs including both permanent and on-contract staff. The participants were met, and an explanation of the research and its purpose was explained to gain their trust and interest to participate.

Data collection

Data on KAPs of MWs and AWs on noise exposure were collected using self-administered questionnaires, which consisted of close-ended questions. The questionnaire was based on a Likert scale using the "strongly agree to strongly disagree", "Yes/No/I don't know, and Yes/No/not sure" scale. The contents of the questionnaire were derived from similar studies (Nyarubeli et al. 2020). The University of Johannesburg's translation department assisted in translating the questionnaire into Sepedi, which is the local language in the study area. The questions on the questionnaire were pre-coded and organized to answer each objective of the study and to give clear and simple answers for the participants to choose from. All study rationales, objectives, and rights were explained to the participants, and consent was obtained.

Pilot study

A pilot study was conducted to assess the feasibility of the data collection instrument and the appropriateness of the data collection instrument for the study. Prior to data collection for the pilot study, access to the study site was provided with an approval letter by the department of health Limpopo province. The approval was presented to the head of institutions for permission to access the participants where the data collection for the pilot study took place. Participants were randomly chosen based on availability. The pilot study included 10 MWs and 10 AWs who did not form part of the main study. The participants were from the exact study population performing the same duties as the target population. A meeting between the participants and the researcher was held to introduce the study to the participants and explain the objectives. The participants were given consent forms to either accept or refuse to participate in the study. The consented participants were given the questionnaires to fill. The participants were given enough time to go through the questions and understand them fully. During collection of the questionnaire, an interview was

conducted with the participants to obtain their view and insights regarding the easiness, appropriateness and readability of the questions. The questions were further revised based on the recommendations and suggestions from the participants. The validity and reliability of the data collection tool was assessed.

Data analysis

Completed questionnaires were collected and checked for correctness and accuracy. The data were captured on a Microsoft Excel spreadsheet. The Statistical Package for Social Sciences (SPSS) software (version 27) was used to analyze the data. The association between the outcomes and the exposure were calculated using odds ratios. The data was analyzed based on the frequency distribution and the categorical variable's frequency distributions were run and depicted as bar graphs. Multivariate regression was used to determine the influence of socio-demographic status on KAPs on noise exposure and its effects.

Regression analysis was used to determine the effects of demographic status on KAPs on occupational noise. The awareness and practices for preventing noise exposure were analyzed using the frequency distribution and multivariate regression for the adjusted odds ratio (AOR) to compare the exposed and non-exposed groups. The attitude towards occupational noise exposure was analyzed using the frequency distribution and multivariate regression for the AOR to compare the exposed and non-exposed groups. The knowledge of noise controls was analyzed using the frequency distribution and multivariate regression for the adjusted and crude odds ratio (COR) to compare the exposed and non-exposed groups.

Results

Socio-demographics

Of the 342 questionnaires that were distributed, 237 were completed and returned. Eight participants withdrew from the study and the study achieved a response rate was 69%. The socio-demographics of the participants are presented in Table 1. Participants from both MWs and AWs were dominated by African female workers between the ages of 36–45 years. Most MWs (50%) had between 6–10 years of work experience, 61% of them completed secondary education and 72% of them were on contracts. On the other hand, most AWs (43.6%) had more than 11 years of work experience, 61.1% of them had tertiary education and many of them (84.1) were permanent workers. MWs were more likely to have 1–5 years of experience than AWs (COR = 1.65, CI 0.79–3.41).

Knowledge traits

Table 2 shows the frequencies of the participants' knowledge regarding occupational noise and its effects. From Table 2, it can be noted that both MWs and AWs were knowledgeable about noise, however, MWs were more knowledgeable about noise compared to AWs. Many of the AWs (38.9%) were unaware that ringing in the ears (tinnitus) is a sign of hearing loss while 56.4% of the MWs were aware. This means that although the AWs were knowledgeable about noise exposure and its effects, they were not aware of the symptoms and signs of ONIHL. Interestingly, many of the MWs (48.7%) believed that ONIHL has a cure while 43.4% of the AWs answered "No". Concerning, 30.8% of the MWs believed that ONIHL can be cured using traditional medicine. Furthermore, both MWs and AWs believed that ONIHL can be treated using the medicine. Although both MWs and AWs stated that ONIHL can be cured, they were aware that NIHL is permanent. From Table 2, it can also be noted that MWs were more knowledgeable on measures that can be taken to prevent noise exposure and subsequent health effects relative to AWs.

Table 1. Frequency distribution and crude odds ratios (COR) of the socio-demographic and occupational characteristics of the research participants.

	MWs		AWs			
Variables	N	%	N	%	COR	CI (95)
Participants demographics						
Age group						
18–25	4	1.7	3	2.7	0.3	0.3–3.34
26–35	57	24.9	22	19.5	1.59	0.8–3.16
36–45	82	35.8	41	36.3	Reference	Reference
46–55	68	29.7	38	33.6	0.79	0.41–1.50
56–65	18	7.9	9	0.1	1.0	0.3–2.77
Sex						
Male	36	30.8	51	45.1	0.3	0.18–0.52
Female	80	68.4	62	54.9	Reference	Reference
Race						
African	110	0.94	106	93.8	4.15	0.46–37.76
Coloured	1	0.09	4	3.5	Reference	Reference
Indian	1	0.09	0	0.0	Undefined	Undefined
White	4	3.40	3	2.7	5.33	0.38–75.78
Highest level of education						
No education	5	4.30	0	0	Undefined	Undefined
Completed primary level	19	16.20	5	4.4	8.46	2.89–24.72
Completed secondary level	61	52.10	39	34.5	3.48	1.9–6.24
Completed tertiary level	31	26.50	69	61.1	Reference	Reference
Occupational characteristics						
Years of experience						
1–5	28	23.9	16	14.2	1.65	0.79–3.41
6–10	50	42.7	47	41.6	Reference	Reference
More than 11	38	32.5	49	43.4	0.73	0.41–1.30
Employment status						
Permanent	44	37.6	95	84.1	0.12	0.06–0.22
Contract	72	61.5	18	15.9	Reference	Reference

COR: crude odds ratio, CI: confidence interval.

Table 3 shows the COR and AOR for the study participants. The CORs were calculated to determine the participant's knowledge of noise controls in their workplace. The AORs were calculated to compare the awareness and practices on noise exposure between MWs and AWs. The awareness of MWs regarding noise in the workplace was 1.04 times greater than that of AWs (COR 1.54 CI 0.59–4.06). MWs were 1.69 times more likely to believe that hearing loss can be cured (COR 1.69 CI 0.92–3.14) and 3.05 times more likely to believe that traditional medicine can heal NIHL with than the AWs (COR 3.05 CI 1.53–6.09) compared to AWs. From Table 4, it further is noted that MWs were 0.74 times less likely to know that noise can affect communication compared to AWs (COR 0.74 CI 0.14–4.07), however, MWs 4.05 times more likely to know that wearing earplugs can prevent hearing loss compared AWs (COR 4.05, CI 2.04–8.02). MWs were 1.2 times more likely to know that hearing loss due to noise exposure can be permanent than AWs (COR 1.2 CI 1.51–5.37). MWs were 3.22 times more likely to know that hearing loss can occur when one is continuously exposed to noise levels above 85 dB(A) for 8 hours compared AWs (AOR 0.46 CI 0.18–1.16).

There was no relationship between most of the sociodemographic variables and the knowledge traits. A comparison between poor hearings of speech is a sign of hearing loss and age of participants, there was no relationship ($p = 0.234$), results also showed no relation while comparing this knowledge trait with years of experience ($p = 0.683$). Knowledge regarding ringing in ears as a sign of hearing loss showed no relation with age ($p = 0.894$). However, a relation was seen with employment status ($p = 0.006$), and higher level of education ($p = 0.048$) for the knowledge of poor hearings of speech is a sign of hearing loss.

Table 2. Frequency distributions of knowledge characteristics of the research participants.

Questions	Answers	MWs N (%)	AWs N (%)	Total N (%)
Noise is an unwanted sound	Yes	95 (81.9)	91 (80.5)	186 (81.2)
	No	16 (13.7)	17 (0.15)	33 (14.4)
	I don't know	5 (4.3)	5 (4.3)	10 (4.4)
Ear infection can cause hearing loss	Yes	98 (83.8)	79 (69.9)	177 (77.3)
	No	14 (0.12)	19 (16.8)	33 (14.4)
	I don't know	4 (3.4)	15 (13.3)	19 (8.3)
Poor hearing of speech is a sign of hearing loss	Yes	87 (74.4)	71 (62.8)	158 (0.69)
	No	16 (13.7)	29 (25.7)	45 (19.7)
	I don't know	13 (11.1)	13 (11.5)	26 (11.4)
Have you ever heard of hearing loss due to noise exposure?	Yes	63 (53.8)	63 (55.8)	126 (0.55)
	No	44 (37.6)	38 (33.6)	82 (35.9)
	I don't know	9 (7.7)	12 (10.6)	21 (9.2)
Ringing in the ears is a sign of hearing loss	Yes	66 (56.4)	36 (31.9)	102 (44.5)
	No	23 (19.7)	32 (28.3)	55 (0.24)
	I don't know	27 (23.1)	44 (38.9)	71 (0.31)
Ear discharge is a sign of hearing loss to noise exposure	Yes	58 (49.6)	27 (23.9)	85 (37.1)
	No	31 (26.5)	49 (43.4)	80 (34.9)
	I don't know	27 (23.1)	37 (32.7)	64 (27.9)
Does hearing loss have a cure?	Yes	57 (48.7)	32 (28.3)	89 (38.9)
	No	18 (15.4)	42 (37.2)	60 (26.2)
	I don't know	41 (0.35)	39 (34.5)	80 (34.9)
Is there any traditional medicine to heal hearing loss?	Yes	36 (30.8)	21 (18.6)	57 (24.9)
	No	48 (41.9)	35 (0.31)	83 (36.2)
	I don't know	32 (27.4)	57 (50.4)	89 (38.9)
Can noise-induced hearing loss be treated with medicine	Yes	59 (50.4)	40 (35.4)	99 (43.2)
	No	23 (19.7)	44 (38.9)	67 (29.3)
	I don't know	34 (29.1)	29 (25.7)	63 (27.6)
Can stopping to work in a noisy environment help recover hearing loss due to noise	Yes	72 (61.5)	40 (35.4)	112 (0.49)
	No	25 (21.4)	43 (38.1)	68 (0.3)
	I don't know	18 (15.4)	30 (26.5)	48 (0.21)
Can noise affect communication?	Yes	95 (81.2)	69 (61.1)	164 (71.6)
	No	10 (8.5)	23 (20.4)	33 (14.45)
	I don't know	11 (9.4)	21 (18.6)	32 (0.14)
Can noise put one in danger of dreaming sounds	Yes	62 (0.53)	33 (29.2)	95 (41.5)
	No	25 (21.4)	37 (32.7)	62 (27.15)
	I don't know	29 (24.8)	42 (37.2)	71 (0.31)
Does wearing earplugs prevent hearing loss	Yes	71 (60.7)	38 (33.6)	109 (47.6)
	No	27 (23.1)	36 (31.9)	63 (27.5)
	I don't know	18 (15.4)	39 (34.5)	57 (24.9)
Hearing loss due to noise exposure can be permanent	Yes	72 (61.5)	44 (38.9)	116 (50.7)
	No	20 (17.1)	29 (25.7)	49 (21.4)
	I don't know	23 (19.7)	40 (35.4)	63 (27.55)
Hearing loss occurs when one is continuously exposed to a noisy environment that is 85dB (A) loud for 8 hours.	Yes	58 (49.6)	27 (23.9)	85 (37.1)
	No	19 (16.2)	29 (25.7)	48 (0.21)
	I don't know	38 (32.5)	57 (50.4)	95 (41.5)

MWs: maintenance workers, AWs: administration workers.

Attitudes

Table 4 shows the frequencies of the participant's attitudes regarding occupational noise and its effects. The results in Table 4 show that both MWs and AWs were aware of the importance of having noise regulations in the workplace and that noise prevention is both the responsibility of the employer and the employees. Only 16.2% of participants were not sure whether hearing loss is caused by other factors like age, injury, etc.

Table 5 shows the participants' CORs and AOR on exposure to noise and its health effects. MWs were 0.84 times less likely to agree that it is not important to have regulations on noise in my workplace than AWs (COR 0.84 CI 0.40–1.73). They were also 0.59 times less likely to believe that the employee and the employer must share responsibility for

Table 3. Crude odds ratios (COR) and adjusted odds ratios of the knowledge characteristics of the research participants.

Questions	Answers	COR	CI (95%)	AOR	CI (95%)
Noise is an unwanted sound	Yes	1.04	0.29–3.73	1.67	0.18–15.63
	No	0.94	0.23–3.88	0.28	34.42
	I don't know	Reference	Reference	Reference	Reference
Ear infection can cause hearing loss	Yes	4.65	1.48–14.58	0.46	0.06–3.59
	No	2.76	0.75–10.15	0.27	0.26–2.92
	I don't know	Reference	Reference	Reference	Reference
Poor hearing of speech is a sign of hearing loss	Yes	1.23	0.53–2.81	0.25	0.07–0.86
	No	0.56	0.21–1.47	0.45	0.01–2.11
	I don't know	Reference	Reference	Reference	Reference
Have you ever heard of hearing loss due to noise exposure?	Yes	1.33	0.52–3.39	0.44	0.07–2.54
	No	1.54	0.59–4.06	1.25	0.21–7.35
	I don't know	Reference	Reference	Reference	Reference
Ringing in the ears is a sign of hearing loss	Yes	2.99	1.59–5.60	0.44	0.14–1.42
	No	1.71	0.57–2.40	3.33	0.68–16.3
	I don't know	Reference	Reference	Reference	Reference
Ear discharge is a sign of hearing loss to noise exposure	Yes	2.94	1.50–5.78	0.64	0.19–2.24
	No	0.8	0.44–1.69	2.45	0.64–9.4
	I don't know	Reference	Reference	Reference	Reference
Does hearing loss have a cure	Yes	1.69	0.92–3.14	0.47	0.15–1.46
	No	0.41	0.20–0.83	1.39	0.33–5.74
	I don't know	Reference	Reference	Reference	Reference
Is there any traditional medicine to heal hearing loss?	Yes	3.05	1.53–6.09	0.19	0.45–0.79
	No	2.44	1.32–4.51	0.38	0.10–1.46
	I don't know	Reference	Reference	Reference	Reference
Can noise-induced hearing loss be treated with medicine	Yes	1.26	0.67–2.38	0.42	0.12–1.42
	No	0.45	0.22–0.90	2.0	0.47–8.56
	I don't know	Reference	Reference	Reference	Reference
Stopping work in a noisy environment can help recover NIHL?	Yes	3.0	1.49–6.05	0.36	0.08–1.65
	No	1.0	0.45–2.08	0.23	0.04–1.38
	I don't know	Reference	Reference	Reference	Reference
Can noise affect communication	Yes	2.63	1.19–5.81	0.74	0.14–4.07
	No	0.83	0.29–2.35	1.05	0.08–13.45
	I don't know	Reference	Reference	Reference	Reference
Can noise put one in danger of dreaming sounds	Yes	2.72	1.44–5.13	0.44	0.13–1.48
	No	0.98	0.49–1.96	3.50	0.55–22.30
	I don't know	Reference	Reference	Reference	Reference
Does wearing earplugs prevent hearing loss	Yes	4.05	2.04–8.02	0.71	0.22–2.24
	No	1.63	0.77–3.44	2.89	0.62–13.44
	I don't know	Reference	Reference	Reference	Reference
Hearing loss due to noise exposure can be permanent	Yes	2.85	1.51–5.37	0.53	0.19–1.47
	No	1.2	0.56–2.58	0.47	0.12–1.80
	I don't know	Reference	Reference	Reference	Reference
Hearing loss occurs when one is continuously exposed to a noisy environment that is 85dB (A) loud for 8 hours.	Yes	3.22	1.74–5.95	0.46	0.18–1.16
	No	0.98	0.48–2.00	0.53	0.15–1.83
	I don't know	Reference	Reference	Reference	Reference

controlling noise in the workplace compared to AWs (COR 0.59 CI 0.32–1.11). MWs were 0.76 times less likely to agree that the employer should be notified when they have ONIHL than the AWs (AOR 0.72 CI 0.28–1.82). MWs were 3.29 times more likely to strongly agree that other factors like age, injury, etc. can cause NIHL compared to AWs (COR 3.29 CI 1.41–7.66). MWs were 1.43 times more likely to strongly agree that ear screening and assessments are not important compared AWs (COR 1.43 CI 0.63–3.2). MWs were 2.68 times more likely to agree that HPDs are a burden and uncomfortable compared AWs (AOR 1.52 CI 0.40–5.78) and were also 0.77 times less likely to strongly agree that they can use HPDs effectively without training compared to AWs (COR 0.77 CI 0.24–2.43). MWs were 0.34 times less likely to agree that they should be compensated for ONIHL compared to AWs (COR 0.34 CI 0.16–0.71) and 0.84 times more likely to agree that wearing HPDs is not their responsibility compared to AWs (AOR 1.59 CI 0.32–7.85).

Practices

Table 6 shows the frequency distributions of knowledge characteristics of MWs and AWs. From Table 6 it can be observed that 88.9% of MWs and 79.6% of AWs were never trained on occupational noise, whereas 85.5% of MWs and 60.2% of AWs have not undergone entry or periodical audiometry assessments. Furthermore, there were no information tools such as posters on noise control in the workplace indicating places or equipment that require HPDs when used. Despite the lack of information tools and training, 41.9% of MWs and 69% of AWs were aware of the OHS Act (85 of 1993). About 88.8% of MWs and 92% of AWs never received HPDs hence 98% of MWs and 93% of AWs never used HPDs when working in a noisy environment. About 6.8% of MWs and 4.4% of AWs have reported incidents of noise exposure to their employers compared to 91.5% of MWs and 87.6% of AWs that have reported any noise exposure incident.

Table 7 shows the participants' crude odds ratios (CORs) and adjusted odds ratios (AORs) on the awareness of practices. MWs were 2.68 times more likely to have not heard of the OHS Act (85 of 1993) compared to AWs (COR 2.68 CI 1.55–4.65) and were 0.58 times less likely to have attended occupational noise training compared to AWs (COR 0.58 CI 0.25–1.35). MWs were 0.3 times less likely to have gone for audiometry screening since working in the health facility compared to AWs (AOR 0.46 CI 0.12–1.99). MWs were 4.04 times more likely to have been provided with HPDs compared to AWs (COR 4.04 CI 1.11–14.73) and were also 1.11 times more likely to use HPDs when working in a noisy environment compared to AWs (COR 1.11 CI 0.49–2.52). MWs were 0.57 times less likely to be aware of any form of information available regarding health and safety on noise control compared to AWs (COR 0.57 CI 0.25–1.29), however, MWs were 1.39 times more likely to be aware of the availability of posters in areas that require the use of HPDs compared to AWs (COR 1.39 CI 0.52–3.70). MWs were 1.48 times more likely to have reported a noise exposure incident to their employer compared to AWs (AOR 0.82, CI 0.58–11.44).

The results showed relation on some of the sociodemographic with awareness of practices with others showing no relation. The comparison between the question of have you ever heard of the Occupational Health and Safety Act, 85 of 1993, showed relation with higher level of education (p value 0.035) and no relation with employment status (p value 0.523). There was also relation between the question of have you ever gone for ear screening since you started working in the health facility, with age (p value 0.016). No relationship was there for the question do you use hearing protectors when you are working in a noisy environment with employment status (p value 0.419).

Discussion

Knowledge

Overall, both MWs and AWs had good knowledge of noise exposure and its health effects, however, MWs were more knowledgeable than AWs (Table 2). For example, the knowledge of MWs on noise exposure in the workplace was 1.04 times greater than that of AWs. Nonetheless, both workers displayed poor knowledge of the maintenance of ONIHL. The lack of knowledge on the maintenance of ONIHL can be attributed to the lack of training on occupational noise exposure. This is not surprising since 88.2% of the employees never received training related to noise exposure in the workplace. The findings are in line with those of Mrema et al. (2015) who found that there is limited training on occupational health safety, particularly in low-middle-income countries where health and safety are not prioritized. The lack of knowledge regarding NHIL in MWs and AWs must be addressed because previous studies (Ismail et al. 2013; Nyarubeli et al. 2019, 2020) reported an association between a lack of knowledge and a high prevalence of NIHL among workers.

Age and work experience were major determining factors in the knowledge of noise and its health effects. Most of the workers that knew about noise and its effects were workers that had long experience at work than new workers. Since more than 80% of the workers were never trained, the knowledge could be from experience acquired working in noisy

Table 4. Frequency distributions of attitude characteristics of the research participants.

Questions	Answering options	MWs N (%)	AWs N (%)	Total N (%)
It is not important to have regulations on noise in my working place.	Strongly agree	22 (18.8)	20 (17.7)	42 (18.3)
	Agree	15 (12.8)	18 (15.9)	33 (14.4)
	Disagree	54 (46.2)	41 (36.3)	95 (40.2)
	Strongly disagree	24 (20.5)	28 (24.8)	52 (22.7)
	Not sure	1 (0.09)	6 (5.3)	7 (3.1)
It is a shared responsibility of the employee and the employer to control noise in the workplace	Strongly agree	54 (46.2)	29 (25.7)	83 (36.2)
	Agree	42 (35.9)	38 (33.6)	80 (34.9)
	Disagree	14 (0.12)	30 (26.5)	44 (19.2)
	Strongly disagree	6 (5.1)	10 (8.8)	16 (0.07)
	Not sure	0 (0)	6 (5.3)	6 (2.6)
My employer should be notified if I have hearing loss	Strongly agree	60 (51.35)	36 (31.9)	96 (41.9)
	Agree	38 (32.5)	30 (26.5)	68 (29.7)
	Disagree	5 (4.3)	22 (19.5)	27 (11.8)
	Strongly disagree	9 (7.7)	18 (15.9)	28 (11.8)
	Not sure	2 (1.7)	7 (6.2)	9 (3.9)
Hearing loss is caused by other things like age, injury, etc. but not noise.	Strongly agree	32 (27.4)	10 (8.8)	42 (18.3)
	Agree	18 (15.4)	19 (16.8)	37 (16.2)
	Disagree	36 (30.8)	37 (32.7)	73 (31.9)
	Strongly disagree	17 (14.5)	23 (20.4)	40 (17.5)
	Not sure	13 (11.1)	24 (21.2)	37 (16.2)
Working in noise for just 1 day cannot cause harm to my hearing	Strongly agree	14 (12)	14 (12.4)	28 (12.2)
	Agree	18 (15.4)	30 (26.5)	48 (0.21)
	Disagree	48 (41.3)	25 (22.1)	73 (31.9)
	Strongly disagree	13 (11.1)	17 (0.15)	30 (13.1)
	Not sure	22 (18.8)	27 (23.9)	49 (21.4)
Ear screening and assessments are not important	Strongly agree	21 (17.9)	14 (12.4)	35 (15.3)
	Agree	13 (11.1)	13 (11.5)	26 (11.4)
	Disagree	35 (29.9)	29 (25.7)	64 (27.9)
	Strongly disagree	40 (34.5)	38 (33.6)	78 (34.1)
	Not sure	7 (0.06)	16 (14.2)	23 (0.1)
I think I can use hearing protectors effectively without training	Strongly agree	6 (5.1)	7 (6.2)	13 (5.7)
	Agree	16 (13.7)	16 (14.2)	32 (0.14)
	Disagree	57 (48.7)	51 (45.1)	108 (47.2)
	Strongly disagree	17 (14.5)	22 (19.5)	39 (0.17)
	Not sure	20 (17.1)	16 (14.2)	36 (15.7)
Hearing protectors are a burden and are uncomfortable	Strongly agree	8 (6.8)	6 (5.3)	14 (6.1)
	Agree	15 (12.8)	7 (6.2)	22 (9.6)
	Disagree	47 (40.2)	43 (38.1)	90 (39.3)
	Strongly disagree	24 (20.5)	28 (24.8)	52 (22.7)
	Not sure	21 (17.9)	29 (24.8)	49 (21.4)
My employer should compensate me for my acquired noise-induced hearing loss	Strongly agree	59 (50.4)	26 (0.23)	85 (37.1)
	Agree	20 (17.1)	27 (0.23)	46 (0.2)
	Disagree	14 (0.12)	20 (17.7)	34 (14.9)
	Strongly disagree	4 (3.4)	16 (14.2)	20 (8.7)
	Not sure	19 (16.2)	25 (22.1)	44 (19.2)
Wearing hearing protectors is not my responsibility	Strongly agree	5 (4.3)	5 (4.4)	10 (4.4)
	Agree	10 (8.5)	9 (0.08)	19 (8.3)
	Disagree	57 (48.7)	43 (38.1)	100 (43.7)
	Strongly disagree	34 (29.3)	38 (33.6)	72 (31.4)
	Not sure	10 (8.5)	18 (15.9)	28 (12.2)

environments (Ologe 2005). In a similar study, Zulkefli et al. (2017) found that workers with more than 10 years of working experience were 3 times more knowledgeable than those with less than 10 years. Furthermore, the 30–44 and 45–59 age groups were at a higher risk of noise exposure and there was also evidence of the effects of noise exposure on the 29 and less age group. Our findings are in line with those of Rachiotis et al. (2006) who found that workers over 40 years were 5.3 times more likely to develop NIHL compared to younger employees. Guerra et al. (2005) categorized workers into four age groups and found that those

Table 5. Crude odds ratios (COR) and adjusted odds ratios (AOR) of the participants' attitudes.

Question	Answers	COR	CI (95%)	AOR	CI (95%)
It is not important to have regulations on noise in my working place.	Strongly agree	0.84	0.40–1.73	1.87	0.64–5.48
	Agree	0.63	0.29–1.40	0.35	0.07–1.84
	Disagree	Reference	Reference	Reference	Reference
	Strongly disagree	0.65	0.33–1.28	1.32	0.44–3.93
	Not sure	0.13	0.01–1.09	0.96	0.96–0.96
It is a shared responsibility of the employee and the employer to control noise in the workplace	Strongly agree	Reference	Reference	Reference	Reference
	Agree	0.59	0.32–1.11	0.73	0.29–1.86
	Disagree	0.25	0.12–0.55	1.51	0.43–5.28
	Strongly disagree	0.32	0.11–0.98	0.39	0.037–4.08
	Not sure	Undefined	Undefined	Undefined	Undefined
My employer should be notified if I have hearing loss	Strongly agree	Reference	Reference	Reference	Reference
	Agree	0.76	0.40–1.43	0.72	0.28–1.82
	Disagree	0.14	0.05–0.39	0.40	0.04–4.10
	Strongly disagree	0.3	0.12–0.74	0.75	0.13–4.26
	Not sure	0.17	0.03–0.87	0.90	0.05–15.52
Hearing loss is caused by other things like age, injury, etc. but not noise.	Strongly agree	3.29	1.41–7.66	0.69	0.24–1.96
	Agree	0.97	0.44–2.15	2.06	0.42–10.20
	Disagree	Reference	Reference	Reference	Reference
	Strongly disagree	0.76	0.35–1.65	0.73	0.17–3.12
	Not sure	0.56	0.25–1.26	0.85	0.17–4.24
Working in noise for just 1 day cannot cause harm to my hearing	Strongly agree	0.52	0.22–1.26	0.53	0.11–2.49
	Agree	0.31	0.15–0.67	1.42	0.38–5.22
	Disagree	Reference	Reference	Reference	Reference
	Strongly disagree	0.4	0.17–0.95	3.18	0.76–13.35
	Not sure	0.42	0.20–0.89	1.11	0.31–3.94
Ear screening and assessments are not important	Strongly agree	1.43	0.63–3.2	0.59	0.17–2.04
	Agree	0.95	0.39–2.31	0.54	0.11–2.60
	Disagree	1.15	0.59–2.22	0.68	0.23–1.97
	Strongly disagree	Reference	Reference	Reference	Reference
	Not sure	0.42	0.15–1.22	0.57	0.08–3.69
I think I can use hearing protectors effectively without training	Strongly agree	0.77	0.24–2.43	0.08	0.005–1.30
	Agree	0.89	0.41–1.97	0.41	0.10–1.68
	Disagree	Reference	Reference	Reference	Reference
	Strongly disagree	0.69	0.33–1.44	0.22	0.02–2.63
	Not sure	1.12	0.52–2.39	0.08	0.003–1.72
Hearing protectors are a burden and are uncomfortable	Strongly agree	1.22	0.39–3.80	0.96	0.16–5.86
	Agree	1.96	0.73–5.27	1.52	0.40–5.78
	Disagree	Reference	Reference	Reference	Reference
	Strongly disagree	0.78	0.4–1.55	0.78	0.22–2.80
	Not sure	0.69	0.34–1.38	0.78	0.22–2.80
My employer should compensate me for my acquired noise-induced hearing loss	Strongly agree	Reference	Reference	Reference	Reference
	Agree	0.34	0.16–0.71	0.69	0.18–2.64
	Disagree	0.31	0.14–0.70	1.29	0.32–5.27
	Strongly disagree	0.11	0.03–0.36	0.81	0.07–8.93
	Not sure	0.33	0.16–0.71	2.11	0.65–6.77
Wearing hearing protectors is not my responsibility	Strongly agree	0.75	0.21–2.77	0.47	0.04–5.86
	Agree	0.84	0.31–2.24	1.59	0.32–7.85
	Disagree	Reference	Reference	Reference	Reference
	Strongly disagree	0.68	0.38–1.24	1.38	0.50–3.81
	Not sure	0.42	0.18–1.0	0.58	0.10–3.39

between 30 and 39 years were 1.3 times more likely to develop NIHL. Those between 40 and 49 years were 6 times more likely to develop NIHL and those over 50 years were 21.3 times more likely to develop NIHL.

A significant number of MWs (48.7%) while 59% believed that NIHL has a cure while whereas 59% of them believed that it can be cured with medicine. Furthermore, 48.7% believed that NIHL has a cure, whereas 30.8% believed that NIHL could be healed with traditional medicine and 43.2% believed that NIHL can be treated with Western medicine. Themann and Masterson (2019), there is an indication of a lack of knowledge of workers' treatment of NIHL. This is concerning for

Table 6. Frequency distributions of knowledge characteristics of the participants.

Questions	Answers	MWs N (%)	AWs N (%)	Total N (%)
Have you ever heard of the Occupational Health and Safety Act, 85 of 1993?	Yes	49 (41.9%)	78 (69%)	127 (55%)
	No	59 (50.4%)	35 (31%)	94 (41%)
	I don't know	8 (6.8%)	0 (0%)	8 (3.5%)
Have you ever attended any occupational noise training?	Yes	10 (8.5%)	15 (13.3%)	25 (10.9%)
	No	104 (88.9%)	90 (79.6%)	202 (88.2%)
	I don't know	2 (1.7%)	8 (7.1%)	10 (4.3%)
Have you ever gone for ear screening since you started working in the health facility?	Yes	15 (12.8%)	34 (30.1%)	49 (21.4%)
	No	100 (85.5%)	68 (60.2%)	168 (73.4%)
	I don't know	1 (0.09)	11 (9.7%)	12 (5.2%)
Have you ever been provided with hearing protective protectors?	Yes	12 (10.3%)	3 (2.7%)	15 (6.6%)
	No	103 (88.8%)	104 (92%)	207 (90.4%)
	I don't know	1 (0.09%)	6 (5.3%)	7 (3.1%)
Do you use hearing protectors when you are working in a noisy environment?	Yes	14 (0.12%)	12 (10.6%)	26 (11.4%)
	No	98 (83.8%)	93 (82.3%)	191 (83.4%)
	I don't know	4 (3.4%)	8 (7.1%)	12 (5.2%)
Is there any form of information available regarding health and safety on noise control?	Yes	12 (10.3%)	15 (13.3%)	27 (11.8%)
	No	96 (82.1%)	68 (60.2%)	164 (71.6%)
	I don't know	8 (6.9%)	30 (26.5%)	38 (16.6%)
Is there availability of posters in areas that requires the use of hearing protectors?	Yes	12 (10.3%)	7 (6.2%)	19 (8.3%)
	No	95 (81.2%)	77 (68.1%)	172 (75.1%)
	I don't know	9 (7.7%)	29 (25.7%)	38 (16.6%)
Have you ever reported an incident of noise exposure to your employer?	Yes	8 (6.8%)	5 (4.4%)	13 (5.7%)
	No	107 (91.5%)	99 (87.6%)	206 (0.9%)
	I don't know	1 (0.09%)	9 (0.08%)	10 (4.4%)

a country such as South Africa where there is a profound connection between culture, tradition and beliefs which are rooted within people (Govender and Khan 2017). For example, Swanepoel and Almec (2008) conducted a study involving African traditional healers in South Africa and found a connection between cultural beliefs and culture and that people believed that hearing loss can be caused by ancestral spirits and witchcraft. In another study, Govender and Khan (2017) investigated the knowledge of cultural beliefs of mothers in South Africa and found that 60% of the participants believed that angry ancestors, ancestral curses and witchcraft can cause hearing loss. Therefore, there is a need to address this misconception.

Attitudes

Attitudes of workers are mainly attributed to knowledge of a particular subject, both MWs and AWs showed good attitudes on different aspects of the subject. There was a good attitude concerning the noise and its effects and the use of HPDs by workers, this may be due to the ability to perceive the risk posed by working in a noisy environment (Nyarubeli et al. 2020). Our findings showed that both MWs and AWs had a positive attitude towards preventing ONIHL. Most workers responded positively to the signs, symptoms, causes and effects of NIHL and expressed a positive attitude towards the reduction of noise in the workplace. Both MWs and AWs were aware that they cannot effectively use HPDs without proper training. This is an indication that there is a need for training on the effective use of HPDs in these health facilities. In their study, Ammar et al. (2022a) found that targeted training increased the use of HPDs from 10.63% to 66.7% while the intention to use HPDs increased from 77.3% to 89.3% among agro-industrial workers in Malaysia.

Both MWs and AWs also displayed poor awareness of practices of occupational noise exposure, which could be due to a lack of education and training. MWs (49.6%) did not believe that hearing loss occurs when one is continuously exposed to a noisy environment that is 85 dB(A) loud for 8 hours. MWs were more unlikely to know that hearing loss occurs when one is continuously exposed to a noisy environment that is 85 dB(A) for 8 hours (COR 3.22, CI 1.74–5.95). Nyarubeli et al. (2020) found that workers had poor knowledge regarding the act of OHS Act (85 of 1993) which explains the continuous

Table 7. Crude odds ratios (CORs) and adjusted odds ratios (AORs) on the awareness of practices of the participants.

Questions	Answers	COR	CI (95%)	AOR	CI (95%)
Have you ever heard of the Occupational Health and Safety Act, of 1993?	Yes	Reference	Reference	Reference	Reference
	No	2.68	1.55–4.65	0.33	0.86–1.29
	I don't know	Undefined	Undefined	Undefined	Undefined
Have you ever attended any occupational noise training?	Yes	0.58	0.25–1.35	0.59	0.67–5.15
	No	Reference	Reference	Reference	Reference
	I don't know	0.22	0.04–1.05	0.49	0.22–11.10
Have you ever gone for ear screening since you started working in the health facility?	Yes	0.3	0.15–0.59	0.46	0.12–1.96
	No	Reference	Reference	Reference	Reference
	I don't know	0.06	0.008–0.49	Undefined	Undefined
Have you ever been provided with hearing protectors?	Yes	4.04	1.11–14.73	0.41	0.07–2.25
	No	Reference	Reference	Reference	Reference
	I don't know	0.17	0.02–1.42	Undefined	Undefined
Do you use hearing protectors when you are working in a noisy environment?	Yes	1.11	0.49–2.52	0.67	0.07–6.85
	No	Reference	Reference	Reference	Reference
	I don't know	0.47	0.14–1.63	0.41	0.03–4.99
Is there any form of information available regarding health and safety on noise control?	Yes	0.57	0.25–1.29	0.94	0.21–4.15
	No	Reference	Reference	Reference	Reference
	I don't know	0.19	0.08–0.44	0.64	0.11–3.81
Is there availability of posters in areas that requires the use of hearing protectors?	Yes	1.39	0.52–3.70	1.61	0.35–7.47
	No	Reference	Reference	Reference	Reference
	I don't know	0.25	0.11–0.56	1.16	0.23–5.87
Have you ever reported an incident of noise exposure to your employer?	Yes	1.48	0.69–4.68	0.82	0.58–11.44
	No	Reference	Reference	Reference	Reference
	I don't know	0.10	0.01–0.83	Undefined	undefined

exposure to a noisy environment that is 85 dB(A) loud for 8 hours the limits. Treatment and management aspects showed negative attitudes by the workers. It is the responsibility of the employer to ensure there is noise regulation in the workplace. MWs believed working in noise for just one day cannot cause harm to their hearing with 41%, while 15.4% agreed that it can cause harm. Lack of knowledge of noise and its effects also plays a role in the negative attitude of the workers toward the use of HPDs (Nyarubeli et al. 2020). Nyarubeli et al. (2020), also indicated a positive attitude toward the importance of reducing noise in the workplace by use of HPDs and going through hearing assessments.

Practices

Awareness of practice is mainly driven by the knowledge and attitude of the workers. The results showed poor awareness of the practice of occupational noise exposure (Table 2). A significant number of MWs (50.4%) indicated that they have never heard of the occupational health and Safety (OHS) Act (85 of 1993) compared to 69% of AWs who have heard of it. The findings indicate a lack of training which is evidenced by the fact that 88.9% of MWs and 79.6% of AWs never attended occupational noise training. The odds ratios indicated that the MWs are more likely to have not heard of the OHS Act (85 of 1993) (COR 2.68, CI 1.55–4.65). These findings are concerning because the OHS Act 85 of 1993 is the yardstick of all environmental workplaces in RSA excluding mines.

About 82% of MWs and 68% of AWs revealed that there is no information available regarding health and safety and noise control in their workplace. Subsequently, the workers were also less likely to know that there is information available regarding health and safety and noise control in their workplace (AOR 0.94, CI 0.21–4.15) (Table 7). The results further indicated that there were no posters or signages in areas that require the use of HPDs indicated by 81.2% of the workers, The AORs indicate that MWs were less likely to be aware that there was the availability of posters in areas that requires the use of HPDs (COR 0.57, CI 0.52–3.70). For example, the Act requires that the employer must have a copy of the OHS Act displayed in such a manner that all employees can read and be conversant with the contents of the Act. This is important because employees must know their responsibilities and those of their employer towards their health and safety in the workplace.

Besides the lack of training, either a copy of the Act was not available as stipulated by the OHS Act of 1993 or the employees were not reading it.

The lack of awareness in practices was also indicated by 85.5% of MWs that had not gone for ear screening since they started working in the health facility. The CORs (COR 0.3, CI 0.15–0.59) and AORs (AOR 0.46, CI 0.12–1.96) indicated that the MWs were less likely to have gone for an ear screening since they started working in the health facility. Furthermore, 88.8% of MWs were not provided with HPDs, subsequently, few workers used HPDs when working in a noisy environment. The AORs indicate that MWs were more unlikely to use the HPDs in a noisy environment (COR 1.11, CI 0.49–2.52). These findings are similar to that of Ologe (2005) who found a lack of HPDs and poor use of provided HPDs in a millwork plant in Nigeria (Nyarubeli et al. 2020). also found that most workers did not use HPDs even though they were working in noisy environments. Workers that completed secondary and tertiary education displayed better practice than those with less level of education. Workers that are below the secondary level showed ignorance about using the HPDs.

Many MWs (91.5%) and AWs (87.6%) indicated they have never reported an incident of noise exposure to their employer, MWs were more likely to have reported the incidents of hearing loss to the employer (AOR 1.48, CI 0.69–4.68). This could be an indication that the workers are not exposed to noise or they did not know the proper channels of reporting incidents due to a lack of information and training. According to Themann and Masterson (2019), it shows that there is a weakness in terms of practices of occupational noise in workplaces (Ammar et al. 2022b). indicated a need for employers to ensure there is enough protection for workers against occupational noise.

The study is limited to the health facilities in Modimolle-Mookgopong area, which has the biggest hospital being a district-level hospital. The results may be different when the study can be done in bigger health facilities, at levels such as regional and tertiary. The study was conducted with a quantitative method of data collection in which the participants are to answer questions that are given. This limits the participants on other related issues and views of the topic. With the use of close-ended questions, the participants are unable to describe their answers, which can give points that are more informative.

Conclusions

The study found that workers both in the MWs and AWs had good knowledge of noise exposure, signs, and effects. However, poor knowledge of the prevention and treatment of noise exposure effects was depicted. There was a generally positive attitude of workers towards the use of HPDs and their responsibilities regarding noise exposure. Workers showed very poor awareness of the practices of noise exposure and control in the workplace. A need for hearing conservation program is required to ensure all workers are safe from noise hazards in workplaces.

The study has shown inadequate knowledge and poor awareness of practices of occupational noise exposure and its effects. This puts workers at risk for effects of noise exposure, therefore prevention of noise exposure is vital. The following are the recommendations for the workers in health facilities: i) Education, seminars, and training is vital to ensure workers have knowledge and to ensure their knowledge is applied in prevention of the ongoing effects, ii). Development of information posters and pamphlets around the facilities to ensure ongoing and continuous reminder of the effects of noise exposure, iii). As depicted by the OHSA, 1993, ear screening and assessments are required to ensure prevention of further damage or new damage caused by noise to the workers, iv). Engagements with occupational safety officers and audiologist to develop a program to ensure the act is implemented in health facilities for the safety of the workers, and v). Development and review of the safety acts specific to health facilities against noise exposure.

Future studies should consider the development of noise exposure reduction and training models or framework in healthcare facilities to mitigate the NIHL. A comprehensive occupational health and safety programme should also be developed for all healthcare facilities, to include noise monitoring and audiometry assessments among new and existing MWs and AWs to reduce the risks of noise-related exposures.

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Data statement

The data presented in this study are available on reasonable request from the corresponding author.

Ethical clearance

This study was conducted in accordance with the declaration of Helsinki. An ethical clearance was obtained from the University of Johannesburg, Faculty of Health Sciences Research Ethics Committee (REC- 1419–2022).

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