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Occupational Health Problems Associated with Noise Exposure and Control Measures Among Structural Welding Workers in Bonny LGA, Rivers State, Nigeria

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Abstract
Structural welding and fabrication are critical to the development of large-scale infrastructural projects and equipment that power urban cities. This study assessed the occupational health problems associated with noise exposure and control measures among workers in the structural welding and fabrication industry in Bonny Local Government Area, Rivers State. The research design adopted in this study was a descriptive survey design. The study population comprised an estimated 250 structural welding and metal fabrication workers in Bonny Local Government Area. The study sampled all consisted of the entire population of structural welders. Therefore, the sample size of 250 was used. A census sampling technique was adopted. A self-structured test instrument was used for data collection. All analyses were done with the aid of Statistical Product for Service Solution (SPSS). Each finished test instrument was allocated a unique code. Data were analysed using descriptive statistics such as frequency and percentages (%), mean, and standard deviation for noise level, and other research issues. The null hypotheses were tested at the.05 alpha level using inferential regression statistics. The study found that 99.9% of respondents (42.9%) were exposed to harmful levels of noise. Noise exposure had a significant impact on workers' physical, physiological, social, and mental health. The result showed a good level of control measures utilised by the workers. It was recommended that the government, through the Ministry of Environment, must engage in frequent sound level monitoring to confirm workers' exposure levels are within the acceptable limits set by the Federal Environmental Protection Agency.

Keywords: Occupational, Health Problems, Structural Fabrication, Control Measures, Workers

Introduction

Structural welding and fabrication are critical to the development of large-scale infrastructural projects and equipment that powers urban cities. Structures like bridges, buildings and industrial equipment depend on steel that has been fused into a cohesive framework using special techniques by structural welders. This work is important to various industries such as construction, oil and gas, manufacturing and aerospace. However, occupational noise exposure is a significant concern in the structural welding and fabrication industry (Keerthik et al., 2024). The World Health Organisation (WHO) recognises noise pollution as a major environmental contaminant that has an impact on public health, making it a major social problem. Because structural welding and fabrication operations are inherently acoustic, they are frequently recognised as high-risk settings for noise-related health effects within industrial and manufacturing sectors (Aliyeva & Sari, 2025). Globally, occupational noise exposure is responsible for about 16% of hearing loss, and 10% of people worldwide are exposed to sound pressure levels that might cause noise-induced hearing loss (Kerr et al., 2017). A large-scale industrial study revealed that 78.4% of workers were occupationally exposed to noise levels ≥75 dB(A); this has substantial consequences for hearing health across extended high-frequency ranges (9-16 kHz) (Xue et al., 2025). Unlike other industries that experience intermittent noise, the welding and fabrication operations frequently involve continuous or near-continuous noise exposure during production hours (Aliyeva & Sari, 2025). Fabricating and welding noise exposure is common in the welding industry in Africa, which

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is usually characterised by inadequate occupational health regulatory oversight of industries, thus creating conditions where workers may experience elevated health risks compared to more developed regions. Joseph et al. (2017) asserted that welding contributes significantly to the 2.3% disability-adjusted life years lost in developing nations owing to occupational risks. Most African nations adopted international standards on fabricating and welding noise exposure limits, but practical implementation and enforcement remain problematic as many workers operate outside formal regulatory frameworks (Axwesso et al., 2025). The welding and fabrication industry in Nigeria ranges from numerous small-scale workshops and informal operators to large-scale manufacturing facilities. Tomiwa and Osibanjo (2024) revealed that time-weighted average (TWA) noise measurements typically range from 85-95 dB(A), with peak exposures during specific operations exceeding 100 dB(A) from welding and fabrication workshops in South West Nigeria. The Federal Environmental Protection Agency (FEPA) recommends an occupational exposure guideline of 85 dB(A) for an 8-hour work shift however, a study revealed that 66.4% of metal welding workers were exposed to noise level ≥85 dB(A) and the prevalence of hearing loss was 25.7% (Zaw et al., 2020).Noise is any unjustified disturbance within a desirable frequency spectrum. Noise exposure affects the whole component of health in an individual; the health effects from exposure to noise include physical health effects, physiological, social and mental health effects.

Noise exposure carries some physical health consequences. Physical health effects of noise are the direct and measurable changes caused by noise exposure, most common among which are noise-induced hearing loss and tinnitus. Fabricating and welding noise-induced hearing loss (NIHL) represents one of the most prevalent occupational health diseases globally; it is estimated by the WHO to affect 466 million people worldwide and is the fourth leading cause of disability (World Health Organisation, 2018). Noise-induced hearing loss usually develops predictably, starting with slight variations in the high-frequency threshold that may not be detected with conventional clinical audiometry; continued exposure causes hearing loss that affects speech-frequency ranges (500–4000 Hz), which affects quality of life and communication skills (Aliyeva & Sari, 2025). One typical and crippling effect of exposure to noise at work is tinnitus (ringing in the ear). Tinnitus prevalence rates of 51.9% have been reported in clinical trials of workers exposed to noise, which is significantly higher than rates in the general population (Aliyeva & Sari, 2025). Tinnitus is a persistent effect of occupational hearing loss that might continue even after noise exposure has stopped (Aliyeva & Sari, 2025).

Occupational noise is known to cause certain physiological effects. Physiological effects of noise exposure include sleep disturbance and irritability, hypertension, and impaired cognitive function such as reduced attention and memory. Chronic noise exposure can disrupt normal sleep quality, resulting in reduced sleep duration and daytime fatigue (Lippe, 2025). According to conservative estimates for the European Region, 53 million individuals are irritated, and 34 million have trouble sleeping due to exposure to noise from roads, trains, and aeroplanes. This results in almost 18,000 annual cases of premature death due to ischemic heart disease and stroke, 80,000 more hospital admissions, and 1.7 million more common cases of hypertension (van Beek et al., 2015). Noise also impairs cognitive performance, which is another physiological impact. Workers in noisy industrial environments may have worse cognitive function, according to Lippe (2025), which manifests as inattention and trouble processing complicated information. The need to implement appropriate techniques to safeguard structural welding and fabrication workers from noise is underscored by this. Noise exposure is also associated with social health effects. One major social impact of noise exposure is the non-auditory effects, such as communication problems; communication problems frequently affect speech intelligibility and speech recognition. Zhou and Zhang (2024) asserted that the co-existence of continuous noise exposure and hearing impairment creates communication challenges; the study further highlighted the difficulties experienced by workers with speech recognition in the presence of background noise, which greatly impacts communication and could constitute a safety hazard. One important aspect of communication problems is speech intelligibility; Speech intelligibility refers to the capacity to comprehend spoken language. During in-person or phone interactions, background noise or the surrounding environment might make it difficult to understand what other people are saying. This noise makes it difficult for people to hear warning or danger signals and work instructions (Canadian Centre for Occupational Health and Safety, 2025). Once the level of noise is as high as 78 dB(A), communication between workers becomes difficult even at a distance of one meter. Noise exposure has been associated with mental health effects such as stress. The continuous exposure of workers to noise may trigger the release of stress hormones like cortisol, resulting in fatigue. According to Münzel et al. (2018), noise exposure has been shown to cause mental stress reactions and annoyance, which in turn cause sympathetic and endocrine stress reactions (i.e., elevated stress hormone levels) and psychological disorders like anxiety and depression; all of these

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impair cerebro-cardiovascular and psychological function. Furthermore, it was opined that noise may influence workers to adopt risky lifestyles such as physical inactivity, smoking, and alcohol consumption as stress coping mechanisms (Roswall et al., 2017; Roswall et al., 2018). When it comes to welding and fabrication noise control, the top strategies in the hierarchy of controls are elimination/substitution and engineering controls which must take precedence above administrative measures and PPE (Lippe, 2025). The processes involved in structural welding and fabrication, such as marking, cutting, shaping, assembly, welding and finishing, generate noise above 85 dB(A), which can be effectively controlled at source. The following engineering control solutions were suggested by Lippe (2025): Use of modern welding and cutting equipment with noise reduction elements, utilization of the right welding techniques to reduce noise production while preserving weld quality, frequent equipment maintenance to prevent noise levels from rising due to mechanical deterioration, misalignment, and worn parts, enclosing loud equipment, either fully or partially to reduce noise levels for workers in the vicinity and the use of acoustic barriers that separate noise sources from work areas to limit noise exposure through sound reflection and absorption.

The supplementation of higher-level controls with lower-level noise reduction strategies ensures a more effective approach. Administrative controls involve training of workers, audiometry surveillance, limiting exposure through shifts and implementing comprehensive hearing conservation programs (Xue et al., 2024). Bonny LGA is home to shipyard/support facilities and fabrication yards connected to the oil and gas supply chain; there is a significant chance of increased occupational and community noise exposure due to the local concentration of heavy fabrication and welding activities. Welding and fabrication activities such as grinding, cutting, pneumatic tools, plate shearing, shot-blasting and heavy machine operations all generate noise beyond the recommended threshold of 85 dB(A). Welding in the region is often carried out on a small scale and in informal settings that lack adequate engineering controls and regulatory oversight functions; several studies have also documented the inconsistent use of hearing protection among welders. It was against this background that the study sought to assess the occupational health problems associated with noise exposure and control measures among workers in the structural welding and fabrication industry in Bonny Local Government Area, Rivers State.

The aim of the study was to investigate the occupational health problems associated with noise exposure and control measures among workers in the structural welding and fabrication industry in Bonny Local Government Area, Rivers State. Specifically, the objectives of the study are to**:**

1. assess noise exposure levels among workers in the structural welding and fabrication industry in Bonny Local Government Area, Rivers State.
2. determine the physical health effects associated with noise exposure among workers in the structural welding and fabrication industry in Bonny Local Government Area, Rivers State
3. evaluate physiological health effects associated with noise exposure among workers in the structural welding and fabrication industry in Bonny Local Government Area, Rivers State.
4. ascertain social health effects associated with noise exposure among workers in the structural welding and fabrication industry in Bonny Local Government Area, Rivers State.
5. assess the mental health effects associated with noise exposure among workers in the structural welding and fabrication industry in Bonny Local Government Area, Rivers State.
6. investigate the control measures among workers in the structural welding and fabrication industry in Bonny Local Government Area, Rivers State.

The following hypotheses were formulated to guide the study and were tested at a 0.05 alpha level of significance:

1 .There is no significant effect of noise exposure on the physical health of workers in the structural welding and fabrication industry in Bonny Local Government Area, Rivers State.
2 There is no significant effect of noise exposure on the physiological health of workers in the structural welding and fabrication industry in Bonny Local Government Area, Rivers State.
3 There is no significant effect of noise exposure on the social health of workers in the structural welding and fabrication industry in Bonny Local Government Area, Rivers State.
4 There is no significant effect of noise exposure on the mental health of workers in the structural welding and fabrication industry in Bonny local government area, Rivers State.

Methodology

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The area for this study is Bonny Local Government Area located on Bonny Island, which lies at the southern edge of Rivers State in the Niger Delta region of Nigeria. The LGA is a strategic hub for industrial activity and hosts multinational oil and gas companies and infrastructure. This industrial presence has created fabrication yards, shipyards and metal processing workshops involved in heavy fabrication welding, metal cutting and related engineering works. This contextually rich setting provides the ideal environment for the study of the health effects of noise exposure. A descriptive survey design was adopted for the study as the research design. The population of the study comprised an estimated 250 structural welding and metal fabricator workers who are primarily engaged in the cutting, grinding, plate shearing, shot-blasting, operation of heavy machinery, and related welding activities in Bonny Local Government Area (Bonny LG Area Council). The study sampled all structural welders in the entire population. Therefore, the sample size of 250 was used. A census sampling technique was adopted.

This study's information was gathered using a standardised questionnaire titled Questionnaire on "Health problems associated with noise exposure and control measures among workers in the structural welding and metal fabrication industry". This instrument is in three sections: A, B and C. Section A elucidated information on noise exposure level, while Section B collected information on the health effects of noise exposure among structural welders and metal fabricators; Section C collected data on the control measures implemented using a modified 4-point Likert scale of Always, Sometimes, Rarely, Never. Data were gathered and coded using an Excel spreadsheet before being converted to Statistical Products for Service Solution (SPSS) version 27.0 and analysed using descriptive statistics such as frequency and percentages (%), mean, and standard deviation for noise level, and other research topics. The null hypotheses were tested at the.05 alpha level using one-way Analysis of variance (ANOVA) statistics.

Results

The study's findings from the statistical data analysis are shown below. Although the study's sample size was 250, the analysis was based on 231, yielding a 92.4% return rate.

Table 1: Percentage distribution showing level of noise exposure among workers in the structural welding and fabrication industry in Bonny Local Government Area

Noise level	Category	Frequency	Percentage	Remark
< 70 dB	Safe level	85	36.8	Harmful
70-85dB	Potential risk	47	20.3	
>85	Harmful	99	42.9	
Total		231	100.0	

Table 1 presents the percentage distribution showing the level of noise exposure among workers in the structural welding and fabrication industry in Bonny LGA. The result showed that more of the respondents, 99(42.9%), had a harmful level of noise exposure, 85(36.8%) had a safe level, and 47(20.3%) had a potential risk level of noise exposure. Thus, the level of noise exposure among workers in the structural welding and fabrication industry in Bonny LGA was harmful.

Table 4.2: Physical health effects associated with noise exposure among workers in structural welding and fabrication industry in Bonny LGA

SN	Items	$\bar{X}$	SD
1	Sometimes fail to hear co-workers speaking close by	3.20	0.40
2	Noticed a reduction in ability to hear high-pitched sounds.	3.20	0.40
3	Struggled to understand speech in noisy environments.	3.34	0.83
4	Experienced muffled hearing after a shift.	3.11	0.31
5	Hearing ability has deteriorated since I started working in fabrication.	3.14	0.35
6	Hear ringing, buzzing or hissing sounds in my ears when in a quiet environment.	3.10	0.31
7	The ringing in my ears persists after I leave work.	3.03	0.18
8	The tinnitus sound makes me uncomfortable or distracts me.	3.46	0.74
9	The tinnitus sometimes disturbs my sleep.	3.07	0.25
10	The tinnitus has increased over time	3.06	0.25
	Grand mean/SD	3.17	0.40

Criterion mean = 2.50

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Table 2 showed the physical health effects associated with noise exposure among workers in the structural welding and fabrication industry in Bonny LGA. The result showed that the physical health problems were: tinnitus sound which is uncomfortable or distracting (3.46), struggled to understand speech in noisy environments (3.34), failed to hear co-workers speaking close by (3.20), reduction in ability to hear high-pitched sounds (3.20), deteriorated hearing ability (3.14), and muffled hearing after a shift (3.11).

Table 3: Physiological health effects associated with noise exposure among workers in the structural welding and fabrication industry in Bonny LGA

SN	Items	$\bar{X}$	SD
1	Difficulty falling asleep after noisy work.	3.29	0.70
2	Noise from work prevents restful sleep.	3.33	0.65
3	Awaken often during the night due to noise or humming in ears.	2.50	0.89
4	Felt irritable or short-tempered after a day of noisy work.	3.03	0.18
5	Felt fatigued even after rest.	3.06	0.25
6	Diagnosed with high blood pressure.	3.17	0.46
7	Sometimes notices elevated heart rate during or immediately after noise exposure.	3.06	0.25
8	Felt heart pounding or palpitations during welding or grinding tasks.	3.00	0.91
9	Had headaches or dizziness associated with noise exposure.	3.10	0.40
10	Regularly check my blood pressure because of work noise.	3.00	0.73
11	Found it hard to concentrate on detailed tasks after a noisy shift.	3.03	0.18
12	Ability to recall events is worse after long exposure to loud noise.	3.03	0.17
13	Made more errors in cutting or measurement tasks when noise is high.	3.06	0.25
14	Struggle to maintain attention on tasks in a noisy environment.	3.34	0.71
15	Felt mentally slower or less alert after noise exposure.	3.31	0.79
	Grand mean/SD	**3.08**	**0.39**

Criterion mean = 2.50

Table 3 showed the physiological health effects associated with noise exposure among workers in the structural welding and fabrication industry in Bonny LGA. The result showed that the physiological health problems were: noise from work prevents restful sleep (3.33), difficulty falling asleep after noisy work (3.29), struggle to maintain attention on tasks in noisy environment (3.34), felt mentally slower or less alert after noise exposure (3.31), diagnosed with high blood pressure (3.17), and had headaches or dizziness associated with noise exposure (3.10).

Table 4 Social health effects associated with noise exposure among workers in the structural welding and fabrication industry in Bonny LGA

SN	Items	$\bar{X}$	SD
1	Needed to raise voice to speak with co-workers due to noise.	3.27	0.58
2	Often misunderstood instructions because of the noise.	3.28	0.52
3	Relied on gestures or repeated instructions to understand colleagues.	3.23	0.49
4	Avoided conversations or team coordination during noisy tasks.	3.13	0.34
5	Noise affects ability to coordinate tasks or teamwork.	3.13	0.34
	Grand mean/SD	**3.21**	**0.45**

Criterion mean = 2.50

Table 4 showed the social health effects associated with noise exposure among workers in the structural welding and fabrication industry in Bonny LGA. The result showed that the social health problems were: needed to raise voice to speak with co-workers due to noise (3.27), often misunderstood instructions because of the noise (3.28), and relied on gestures or repeated instructions to understand colleagues (3.23).

Table 5: Mental health effects associated with noise exposure among workers in the structural welding and fabrication industry in Bonny LGA

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SN	Items	$\bar{X}$	SD
1	Felt stressed because strained to hear or communicate.	2.99	0.98
2	Worried about permanent hearing damage from my work.	2.83	0.79
3	Noise exposure makes me feel anxious or uneasy.	2.54	0.81
4	Felt mentally exhausted after a shift in a noisy workshop.	3.00	0.64
5	The noise contributes to my overall stress levels.	2.95	0.60
	Grand mean/SD	**2.86**	**0.76**

Criterion mean = 2.50

Table 5 showed the mental health effects associated with noise exposure among workers in the structural welding and fabrication industry in Bonny LGA. The result showed that the mental health effects were: Felt mentally exhausted after a shift in a noisy workshop (3.00), Felt stressed because strained to hear or communicate (2.99), and worried about permanent hearing damage from my work(2.83).

Table 6: Mean and standard deviation showing control measures utilised by workers in the structural welding and fabrication industry in Bonny Local Government Area, Rivers State

SN	Items	$\bar{X}$	SD
1	Workshop has acoustic enclosures, mufflers or silencers on machines.	3.01	0.75
2	We use quieter welding/grinding equipment or shielding barriers.	2.51	0.71
3	My work schedule is rotated to reduce noise exposure.	2.63	0.61
4	There are rest breaks in a quiet room.	3.32	0.80
5	Tasks are re-scheduled to quieter shifts.	3.32	0.65
6	I consistently use earplugs or earmuffs during all noisy tasks.	3.36	0.66
7	The ear protection provided fits well and is comfortable.	2.97	0.80
8	I have received training about noise and hearing loss.	3.35	0.71
9	The training has increased my use of protection.	3.09	0.99
10	Management enforces hearing conservation measures.	2.66	0.83
11	Coworkers remind each other to wear hearing protection.	3.00	0.64
12	I believe my hearing is protected from noise at work.	2.95	0.60
	Grand mean/SD	**3.09**	**0.72**

Criterion mean = 2.50

Table 6 showed the control measures utilised by workers in the structural welding and fabrication industry in Bonny LGA. The result showed that the control measures utilized by the workers were: Workshop has acoustic enclosures, mufflers or silencers on machines (3.01), rest breaks in a quiet room (3.32), received training about noise and hearing loss (3.36), Workshop has acoustic enclosures, mufflers or silencers on machines (3.01), coworkers remind each other to wear hearing protection (3.00), and use of ear protection which fits well and is comfortable (2.97).

Test of Hypotheses

Hypothesis One: There is no significant effect of noise exposure on the physical health of workers in the structural welding and fabrication industry in Bonny LGA, Rivers State.

Table 7: One-way analysis of variance showing significant effect of noise exposure on the physical health of workers in structural welding and fabrication industry in Bonny LGA

Model		Sum of Squares	df	Mean Square	F	Sig.	Decision
1	Regression	248.710	1	248.710	1888.53	0.00*	H_o rejected
	Residual	30.290	230	.132			
	Total	279.00	231				

***Significant; p< 0.05**

Workers' physical health was shown to be significantly impacted by noise exposure in Bonny's structural welding and fabrication industry, according to the ANOVA analysis (Table 4.7). A substantial effect of noise exposure on workers' physical health was found in the research ($f(1,230) = 1888.53$, $p<0.05$). As a result, the null hypothesis that there is

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no significant effect of noise exposure on the physical health of workers in the structural welding and fabrication industry in Bonny LGA, Rivers State was rejected.

Hypothesis Two: There is no significant effect of noise exposure on the physiological health of workers in the structural welding and fabrication industry in Bonny LGA, Rivers State.

Table 8: One-way analysis of variance showing significant effect of noise exposure on the physiological health of workers in the structural welding and fabrication industry in Bonny LGA

Model		Sum of Squares	Df	Mean Square	F	Sig.	Decision
1	Regression	230.331	1	230.331	1088.489	0.00*	H_o rejected
	Residual	48.669	230	.212			
	Total	279.00	231				

***Significant; p< 0.05**

Workers' physiological health was shown to be significantly affected by noise exposure in Bonny's structural welding and fabrication industry, according to ANOVA analysis (Table 4.8). A substantial effect of noise exposure on workers' physiological health was found in the research ($f(1,230) = 1088.48$, $p<0.05$). Based on this, we can reject the null hypothesis that workers' physiological health is unaffected by noise exposure in the structural welding and fabrication business in Bonny Local Government Area, Rivers State.

Hypothesis Three: Workers in the structural welding and fabrication business in Bonny LGA, Rivers State, are not socially and psychologically impacted by noise exposure.

Table 9: One-way analysis of variance showing significant effect of noise exposure on the social health of workers in the structural welding and fabrication industry in Bonny LGA

Model		Sum of Squares	Df	Mean Square	F	Sig.	Decision
1	Regression	238.434	1	238.434	1353.853	0.00*	H_o rejected
	Residual	40.566	230	.176			
	Total	279.00	231				

***Significant; p< 0.05**

The results of the regression study on the social health effects of noise exposure on workers in Bonny's structural welding and fabrication sector were shown in Table 4.9. Research showed that workers' social health was significantly impacted by noise exposure [$f(1,230) = 1353.853$, $p<0.05$]. That being said, we can now reject the null hypothesis that workers in the structural welding and fabrication business in Bonny Local Government Area, Rivers State, are not socially and health-wise impacted by noise exposure.

Hypothesis Four: There is no significant effect of noise exposure on the mental health of workers in the structural welding and fabrication industry in Bonny LGA, Rivers State.

Table 10: One-way analysis of variance showing significant effect of noise exposure on the mental health of workers in structural welding and fabrication industry in Bonny LGA

Model		Sum of Squares	Df	Mean Square	F	Sig.	Decision
1	Regression	203.746	1	203.746	622.713	0.00*	H_o rejected
	Residual	75.254	230	.327			
	Total	279.000	231				

***Significant; p< 0.05**

The results of the regression study on the mental health effects of noise exposure on workers in Bonny's structural welding and fabrication sector were shown according to the ANOVA analysis (Table 4.10). The study's results showed that workers' mental health was significantly impacted by noise exposure [$f(1,230) = 622.713$, $p<0.05$]. Because of this, we can reject the null hypothesis that workers' mental health is unaffected by noise exposure in the structural welding and fabrication business in Bonny Local Government Area, Rivers State.

Discussion

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The findings of the study revealed that the level of noise exposure among workers in the structural welding and fabrication industry in Bonny LGA was harmful. This implied worker is exposed to harmful levels of noise in the structural welding and fabrication industry. This was anticipated as welding poses an inherent noise danger. This result is consistent with that of Axwesso et al. (2025) in Tanzania, who surveyed three steel plants and found that, on average, steel workers were exposed to noise levels that exceeded the World Health Organisation's recommended limit: 90.9 dBA, 106.9 dBA, and 89.7 dBA. This result is in agreement with Zaw et al. (2020), who found that 25.7% of metal welding employees had hearing loss and 66.4% were exposed to noise levels of 85 dB(A) or higher. It has been determined that all welding activity creates a hazardous amount of noise, which may be explained by the similarity in the study findings.

According to the study's findings, workers' physical health was shown to be significantly impacted by noise exposure. This suggests that noise exposure affects the workers' physical health. This was expected since there are obvious and observable health impacts associated with noise exposure, including tinnitus and noise-induced hearing loss. Consistent with previous research, our data confirms that longer periods of noise exposure are related with increased risks to both hearing and non-hearing health (Keerthik et al., 2024). This finding is also consistent with previous research by Salih et al. (2024) that found a strong correlation between total noise exposure time and the severity of noise-induced hearing loss. Additionally, it lends credence to a regional survey conducted by Syurin and Boiko (2020) that found that industrial workers account for 27.3% of new cases of occupational diseases, specifically sensorineural hearing loss (OSNHL). It can be concluded that all welding activity generates noise-induced hearing loss and tinnitus. The similarities in the examined studies may be explained by the homogeneity of their study designs, as they were all descriptive.

The study findings show a significant impact of noise exposure on workers' physiological health. We can infer that this noise exposure caused physiological health issues. This was anticipated because exposure to noise changes the body's regular functioning. This confirms what Lippe (2025) found: that long-term noise exposure can impair the quality of sleep, shorten the amount of time spent sleeping, and make you feel tired throughout the day. According to the study, industrial workers may experience reduced cognitive function, such as trouble focusing on activities or processing complicated information, from excessive exposure to noise. This study lends credence to the findings of Dimakopoulou et al. (2017), who demonstrated a 2.63-fold increase in the incidence of hypertension for every 10-decibel increase in exposure to aircraft noise throughout the night. In Port Harcourt, Osugba and Kingsley (2022) found that noise had the most negative effect on people's health through stress, discomfort, and impaired focus. This study's findings corroborate the findings by Keerthik et al. (2024), which found a correlation between noise exposure and health effects like hearing loss and sleep problems. All of the studies used the same methods to test the effects of noise exposure, which might explain why the results are comparable.

The study findings showed a significant impact of noise exposure on workers' social health. Workers' mental and emotional well-being were impacted by this undetected noise exposure. Considering that noise may have impacts beyond what the human ear can perceive, this finding did not come as a surprise. This study's findings are in line with those of Zhou and Zhang (2024), who argued that people with hearing impairment and chronic noise exposure had trouble communicating with one another. The results of this study corroborate those of Sakthivel et al. (2025), who linked noise exposure to effects other than hearing loss. The background noise from welding machinery not only affects concentration and increases the risk of errors, but it also impairs speech intelligibility and speech recognition, making it difficult for people to effectively communicate with one another. It can also cause people to withdraw socially. All of the studies used the same methods to test the non-auditory effects of noise exposure, which might explain why the results are so comparable.

The study's results showed that workers' mental health was significantly impacted by noise exposure. Workers had mental health issues due to this loud exposure. The consequences of noise on mental health have been well-documented, so this came as no surprise. In agreement with Münzel et al. (2018), who established a connection between noise exposure and irritation and mental stress reactions, this study found that exposure to noise causes endocrine stress reactions (i.e., raised stress hormone levels), which in turn produce psychological problems such as anxiety and depression. This is in agreement with the findings of Kanu et al. (2025), which linked noise exposure to elevated stress levels and decreased productivity on the job. This conclusion lends credence to the findings of Somnath (2021), who linked noise exposure to a host of negative health outcomes, including disturbed sleep, altered serum

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cortisol levels, cardiovascular illness, and an upsurge in injuries and accidents on the job. The results show that workers' mental health is at risk from being exposed to noise levels above 85 dB(A) for lengthy periods of time; the consistency of the results might be due to similar research designs.

The results demonstrated that the workers made use of control methods such as acoustic enclosures, machine mufflers or silencers, quiet rooms for rest breaks, training on noise and hearing loss, and hearing protection. It was unexpected that workers would take such effective measures to limit their noise exposure, since the data revealed that workers were exposed to and affected by noise at a high level. This finding is in contrast to what Axwesso et al. (2025) found in Dar es-Salaam, Tanzania, where there was no evidence of hearing protection or noise reduction tactics; workers sat close to each other in open rooms and made constant noise all day long. On average, noise exposure was lowered by roughly 20 dB(A) according to a survey by Tikka et al. (2017), which found that laws, new equipment, panels surrounding sources of noise, training, and hearing protection devices all contributed to noise reduction. The consistency of the research methodology could account for the consistency of the results.

Conclusion

The study's results indicated that the majority of metal fabricators and structural welders were exposed to detrimental levels of noise, and the physical, physiological, social, and mental health of workers were significantly impacted by noise exposure. The results showed an adequate level of control measures utilised by the workers, such as acoustic enclosures, mufflers or silencers on machines, rest breaks in a quiet room, training about noise and hearing loss and use of ear protection which fits well and is comfortable.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. The government, through the Ministry of Environment, must engage in frequent sound level monitoring to confirm workers' exposure levels are within the acceptable limits set by the Federal Environmental Protection Agency.
2. Supervisors of fabrication yards should ensure every worker undergoes pre-posting and regular health inspection to prevent physical health effects associated with noise exposure.
3. Workers should ensure they comply with noise control measures consistently and observe their body functions to identify when there is a physiological change such as an increased heart rate to initiate a health check-up.
4. Managers of fabrication yards should ensure quiet rooms are created where breaks can be observed and where normal communication can thrive to prevent social health effects of noise exposure.
5. The Ministry of Health should ensure the mental health of workers is protected through advocacy campaigns on the importance of taking care of mental health and encouraging workers to seek help when their mental health is affected by work.
6. The federal government, through the Ministry of Labour and Productivity, must ensure all fabrication yards have a minimum level of control measures in place, with higher hierarchy controls such as substitution and engineering controls in place while the use of personal protective equipment must be mandatory for all workers while at the work site.

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