

# Effect of Noise on General Health Status of Electrical Generator Workers in Iraq

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## Abstract

Electrical generators in Iraq have been a series problem regarding occupational and environmental pollution. The current study aimed to determine the level of general health status among generator workers in Al Diwaniyah City Iraq, and its correlation with noise and demographic data. A descriptive cross-sectional design was conducted in the current study. It was carried out at the private electrical generators in A-Diwaniyah City from the period between the 15th of October 2020 until the 15th of March 2021. A purposive study of 150 generator workers has been selected. General health was determined by General Health questionnaire (GHQ-28) which is comprised of 28 items, and include four aspects: somatic, social, depression and anxiety. Noise intensity level was measured by sound level meter (SLM). The results of the present study revealed that average level of noise intensity inside the workers' room was (78.12 db); while it was (104.14 db) near the generator. The results also showed that the assessment of most domain (social, depression, and anxiety) was moderate, except for somatic domain which it was good. There was a significant negative correlation between noise and depression and anxiety. It has been concluded that: Most of the generator workers showed a moderate level of general health status; Most of the generators workers had moderate level for anxiety, depression and social aspects; Noise intensities inside the generator rooms exceeds the upper limits accepted for human health.

**Keywords** - Noise, GHQ-28, General Health Status, Generator Workers

## Introduction

Based on the World Health Organization's (WHO) definition, health is a state of complete physical, mental, and social well-being and not merely the absence of disease. Also, General Health (GH) as a sub-directory of the health system is the general condition of the body or mind with reference to soundness and vigor. On the other hand, GH is defined as systematic activities and social acts based on the prevention, Science & Art for disease management, increasing expectancy of life and health promotion that lead to welfare <sup>(1)</sup>.

Workers in their own workplaces are exposed to many different hazards and hazardous conditions that can threaten health and life. Although some hazards are less likely to happen in some work spaces than others, it's

important to assess which hazards are most damaging to the organization and its employees <sup>(2)</sup>.

Electric generators while in operation produce gaseous emissions and high sound levels. These pose serious health risk to not only users but to individuals in the surrounding communities. A recent study conducted in Ibadan revealed high generator noise level of between 91.2 and 100.5 dB(A). This noise level is capable of inducing hearing impairment. Noise Induced Hearing Loss (NIHL) can be caused by one time exposure to noise as well as repeated exposure to noise at various levels of loudness over an extended period <sup>(3)</sup>.

Health effects from generator use can range from auditory (hearing) to non-auditory. Noise and carbon monoxide pose serious health risk and due to the

insidious nature of noise on hearing, many individuals may not discover they have hearing difficulty until it has become worse. In addition, due to the strive to achieve financial sustenance, many often neglect their health and work at relatively short distances from generators, and at long hours . A lack of knowledge is identified as one of the barriers to change. Knowledge about occupational hazards (such as noise from electric generator) is suggested to be a predictor of preventive behaviour at work. Effective behavioural change is facilitated by greater knowledge, experience, and personal risk perception <sup>(3)</sup>.

The current study aimed to determine the level of general health status among generator workers in Iraq , it also aimed to determine the noise levels (by a decibel meter) at the generator location and its correlation with the workers general health domains .

**Methods**

A descriptive cross-sectional design was conducted in the current study . It was carried out at the private electrical generators in A-Diwaniyah City in Iraq from the period between the 15th of October 2020 until the 15th of March 2021 . A purposive study of 150 generator workers was taken in the current study . The final study instrument consists of three parts :

**Part 1: Demographic Data**

This part is concerned with participants’ socio-demographic data. A demographic data sheet, consists

of (10) items, which contain (age, marital status, educational level, monthly income, residency, duration of work at the generator, type of work, smoking status , alcohol intake, BMI).

**Part 2: General Health questionnaire**

The General Health questionnaire (GHQ-28) is comprised of 28 items include somatic symptoms domains (7 items); anxiety domain (7 items); social dysfunction domains (7 items) & depression domain (7 items), the general health questionnaire is a self-administered screening instrument used to measure the psychological distress and general mental health in non-psychiatric persons. The scale was first developed by Goldberger and Hillier (1979) .

**Part 3: Noise intensity measurement**

Noise intensity level was measured by sound level meter (SLM), model: UNI-T; UT352, China, with the ranging of 40dB –160dB

**Statistical Analysis**

Descriptive statistics presented as mean, standard deviation, frequencies and percentages. Chi-square test was used to compare frequencies. Pearson’s correlation test was used to assess the correlations. Level of significance of  $\leq 0.05$  was considered as significant difference or correlation.

**Results**

**Table (1) Mean levels of noise (dBA) at the generation locations**

| Items                          | Mean   | SD   | P value |
|--------------------------------|--------|------|---------|
| Inside the workers’ room (dBA) | 78.12  | 6.15 | 0.000   |
| Near the generator (dBA)       | 104.14 | 2.87 |         |

Table (1) show mean levels of noise (db) at the generation locations, it explains that mean level of noise inside the workers’ room was (78.12 db) ; while mean level of noise near the generator was (104.14 db) . There is a high significant difference in the mean level of noise between inside and outside the workers’ room .

**Table (2) : Descriptive Statistics of overall assessment for GH-28 Domains and overall assessment among generator workers**

| GH-28 Domains                  | No. | M.S. | S.D. | 95% C. I. for Mean |      | Ass.     |
|--------------------------------|-----|------|------|--------------------|------|----------|
|                                |     |      |      | L.b.               | U.b. |          |
| Somatic Domain                 | 150 | 3.1  | 0.87 | 2.9                | 3.2  | Good     |
| Social Domain                  | 150 | 2.96 | 1.11 | 2.63               | 3.45 | Moderate |
| Depression Domain              | 150 | 2.96 | 0.94 | 2.45               | 3.45 | Moderate |
| Anxiety Domain                 | 150 | 2.92 | 1.04 | 2.14               | 3.84 | Moderate |
| Global Mean of Score for GH-28 | 150 | 2.98 | 0.99 | 2.92               | 3.1  | Moderate |

MS : Mean of Scores; SD : Standard Deviation ; Poor : MS = 1-1.99 ; Moderate : MS = 2-2.99 ; Good : MS  $\geq$  2 ; L.b. : lower border ; U.b. : Upper border

Table (2) shows descriptive statistics of overall assessment for GH-28 domains and overall assessment among generator workers, it explains that the assessment of most domain (social, depression, and anxiety) was moderate, except for somatic domain which it was good .

**Table (3) : Correlation (Pearson Coefficient) between noise inside and outside workers' room and domains and total assessment of 28-GH**

|                                | Somatic    | Anxiety    | Social       | Depression   | Total Assessment |
|--------------------------------|------------|------------|--------------|--------------|------------------|
| Noise Inside the workers' room | r = -0.119 | r = -0.030 | r = -0.075   | r = -0.172 * | r = -0.167 *     |
| Noise Near the generator       | r = -0.043 | r = -0.096 | r = -0.170 * | r = -0.028   | r = -0.132       |

\* Significant correlation at p value < 0.05

Table (3) shows correlation (Pearson Coefficient) between noise inside and outside workers' room and domains and total assessment of 28-GH , it shows that there is a significant negative correlation between depression domain and noise level inside the workers' room (r = - 0.172; P<0.05) ; it also explain that there is a significant negative correlation between total assessment and noise level inside the workers' room (r = - 0.167; P<0.05) ; a significant negative correlation between

social domain and noise level inside the workers' room (r = - 0.170; P<0.05) .

## Discussion

The current study recorded that the noise level near the generator is higher than that inside the workers' room, this is a logical result, where the walls and the door were used as isolating agents for the noise that resulting from the operation of the generator .

The average level of noise inside the workers' room in this study is  $(78.12 \pm 6.15 \text{ dBA})$ , this level is higher than the lower limit of acceptable indoor noise level, this result agrees with the study conducted by Alnayli et al., they have evaluated noise pollution in three locations in Al-Diwaniya City, and found that noise pollution was about 21% higher than the accepted levels identified by WHO<sup>(4)</sup>. It was found that noise has undesirable effects on the cardiovascular system exposure to noise greater than 70 dB(A) results in increases in vasoconstriction, heart rate and blood pressure reported a case of persistent ventricular fibrillation upon arousal from sleep by noise, and several reports have suggested that transitional periods during waking from sleep may provoke cardiac arrhythmias<sup>(5)</sup>. A study conducted by Mohammad have reported that cardiovascular effects are associated with long-term exposure to noise in the range of 65–70 dB or more, indicating the private electrical generators as the main source of noise pollution in urban areas<sup>(6)</sup>.

The current study has also revealed that the mean level of noise intensity near the generator was  $(104.14 \pm 2.87 \text{ dBA})$  as in table (1). This result is similar to the result recorded by Al-Naemi and Abdel who found that noise intensity inside the generator room was  $(95.18 \pm 0.78 \text{ dBA})$  which had negative effects on the hearing capabilities of the workers, and resulted in increase in lipid profile markers, and decrease in anti-oxidant indicators, in workers compared to healthy control group. Table (3) shows a negative correlation between the level of noise and the level of general health status in all its dimensions, and this result is identical to what has been scientifically proven that noise has effects on health, a loud and continuous voice causes temporary or permanent loss of hearing, increased blood pressure, distorted heart rate, increased adrenaline, disrupted the proper functioning of the kidney. Damage to the human psyche, a feeling of fear and pressure on the nerves and the ability to focus on thoughts, work and learning. Excessive noise is considered a form of violence because it provokes a sense of helplessness, fatigue, and the desire to use violence against the source of the noise<sup>(7)</sup>.

According to the International Programme on Chemical Safety (WHO 1999), an adverse effect of noise is defined as a change in the morphology and physiology of an organism that results in impairment of functional capacity, or an impairment of capacity to compensate for additional stress, or increases the susceptibility of an organism to the harmful effects of other environmental influences. This definition includes any temporary or long-term lowering of the physical, psychological or social functioning of humans or human organs. The health significance of noise pollution is given in this chapter under separate headings, according to the specific effects: noise-induced hearing impairment; interference with speech communication; disturbance of rest and sleep; psychophysiological, mental-health and performance effects; effects on residential behaviour and annoyance; as well as interference with intended activities<sup>(8)</sup>.

It was reported that oxidative stress induced by noise and hazardous effects of toxic gases may have direct effects on cardiovascular dysfunctions, hormonal disturbances, and hearing disabilities that may interfere with both physical and mental health domains. A recent study have investigated deeply the environmental pollution resulting from the combustion of fuel used in electric power generators in Iraq, especially in the summer and you are the national electric power supplied by almost non-existent state where this problem is a local phenomenon that has serious dimensions to human health; they found that many types of gases emitted from burning fuel electric generators operating in the province of Baghdad indicating the amount of environmental pollution, which is more risk to humans with permitted by the World Health Organization<sup>(9)</sup>.

## Conclusions

It has been concluded that: Most of the generator workers showed a moderate level of general health status. Most of the generators workers had moderate level for anxiety, depression and social aspects. Noise intensities inside the generator rooms exceeds the upper limits accepted for human health. There is a correlation between

noise produced by the generators and the decline in the anxiety and depression aspects of the workers .

**Ethical Clearance** : Taken from University of Kufa ethical committee

**Source of Funding** : Self

**Conflict of Interest** : Nil

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