

# Effect of Long Extended Working Hours on the Occupational Health and Safety of Oil and Gas Workers in the Sultanate of Oman

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## ABSTRACT

**Introduction:** Oil and Gas workers are exposed to numerous hazards which impede their productivity; one such hazard these workers are exposed to is long or extended working hours. Hence, this paper examined the impacts of extended working hours on workers' occupational health and safety at a selected oil and gas company in Oman. Consequently, the workers' opinions on the impacts of extended working hours at the company were critically analyzed to draw potential inferences and proffer solutions to the problem in Oman. The study aimed to critically identify, assess, and highlight the occupational safety problems associated with extended working hours among workers at a selected oil and gas company in Oman.

**Methods:** A total of 128 respondents were randomly selected from the 140 employees and company managers through administered questionnaires. Data collection was done between January 25 and February 30, 2022. The questionnaire consisted of five items statements based on the four-agreement or Likert scale of measurement.

**Results:** A response rate of 91% was derived from the questionnaire administered for the study. Results from data analysis indicated that 73% of the respondents were male while 27% were female. Furthermore, the results indicated that extended working hours have substantial impacts on family life (s=54%), performance (s=68%), productivity, and health of the workers. Extended working hours potentially expose workers to various dangers which bring about numerous adverse effects (stress, fatigue, depression, and loss of concentration) on their occupational health and safety.

**Conclusion:** It is recommended that oil and gas companies establish occupational health and safety guidelines to limit the work times and duration (i.e., time spent at work) through shorter shifts, longer breaks, or extended leaves. Long working hours should be prohibited except on special occasions or unavoidable circumstances to safeguard the health and well-being of staff, which could ultimately enhance the productivity and output of the company.

**Keywords:** Occupational Health, Oil-Gas Workers, Oman, Shift Schedules, Working Hours

## Introduction

The oil and gas industry is regarded as one of the most hazard-prone in the world.<sup>1</sup> The dangers arise from the numerous exploration and exploitation activities ranging from drilling, and evacuation to processing and refining of crude oil, which requires dangerous chemicals, substances, as well as equipment and materials.<sup>2</sup>

Therefore, it is crucial to identify and examine the major sources and causes of accidents, injuries, or fatalities at oil and gas production and processing facilities. The identification and analysis of hazardous processes, equipment, and materials in the oil and gas industry are critical to ensuring a safe working environment.<sup>3</sup> Furthermore, studies on the nature, causes and amelioration strategies of occupational health and safety problems in such an industry are very essential to protect employees.<sup>4</sup> It is also critical to identifying and addressing physical diseases as well as psychological conditions in the workplace, particularly due to the long working hours characteristic of the oil and gas industry.

Accordingly, the typical work week is 48 hours indicating that periods beyond this time frame are considered long working hours or overwork for short.<sup>5</sup> Numerous studies have demonstrated that long working hours are also caused by numerous factors such as job insecurity, rising employer demands and work overload.<sup>6</sup> Similarly, extended working hours are a common feature of working in the oil and gas industry.<sup>7</sup> The processes and operations of the industry often require long working hours or shifts which could pose severe occupational health and safety issues. The long hours spent on the job also have direct and indirect adverse effects on the worker's health and morale. Likewise, long or extended working hours can adversely affect the productivity and well-being of workers.<sup>8</sup>

Studies reported that working long hours disrupts the daily clock of humans, which could greatly impact the occupational health and safety of workers.<sup>9</sup> Accordingly, employees who work 50 hours or more a week have 30% greater chances of contracting stroke and cardiovascular diseases

compared to others on 35 - 40 hours per week schedules.<sup>10</sup> This observation, arises from occupational stress, which could have health consequences such as mental health issues among others.<sup>11</sup> Consequently, long working hours are also linked to several health issues such as an increase in myocardial infarction (otherwise known as a heart attack), loss of coordination, and concentration which could result in serious injuries, accidents, or even fatalities.<sup>12</sup> Over the years, studies have shown that the number of employees who work long and additional hours in the oil and gas industry has soared raising even more concerns about the risks to the occupational health and safety of workers.<sup>13</sup> Workers in the industry typically work 60 or more hours a week, which exposes them to various hazards and risky environments.<sup>14</sup> For example, such workers are exposed to hazards such as vibration, radiation, noise, extreme temperatures, and vibration. As a result of these harmful factors, the occupational health and safety of workers are at risk of respiratory diseases, sensitivity in the eyes, skin diseases, and digestive diseases.<sup>15</sup> Extended work hours cause exhaustion and related health problems due to stress, anxiety, and poor physical exercise, which combined could raise the possibility of accidents, injuries, and deaths among workers.<sup>16</sup>

Likewise, the exposure of workers to other hazards such as physical and chemical risks is a growing occupational health and safety concern for the gas and oil industry. Epidemiological studies show that workers working long hours are exposed to harmful and hazardous materials and radiation and are prone to several health risks.<sup>17</sup> For example, oil and gas workers are prone to evolving heart and cardiovascular diseases, as well as hypertension, stress, chronic fatigue, sleep-quality issues, anxiety, and depression. It stands to reason then that those workers suffering from such conditions present safety risks (in terms of exposure to falls, fractures, wounds, and burns) due to fatigue and lack of focus on themselves as well as colleagues in the workplace.<sup>18</sup>

It is noted that employees and workers who worked long hours had a 61% higher rate of injury and health as well as safety issues compared to individuals who did not work long shifts.<sup>12</sup> Cheng et. al. reported that extended working hours cause a lack of attention/focus for work, which directly impacts the performance and effectiveness of employees.<sup>19</sup> Other researchers have reported that long working hours can affect the psyche of workers,<sup>20</sup> which can have a significant impact on their occupational health and safety. As a result, such workers could suffer frustration and alienation, which grossly undermines their psychological well-being, mental health, and social relationships in society at large.

The review of the literature has clearly shown that long or extended working hours can adversely affect the physical, psychological, and mental as well as performance, efficiency, and productivity of workers in the oil and gas industry. However, the peculiarities of the working environment in various parts of the world suggest that problems and their resulting solutions thereof (such as long or extended working hours in one geographical region or country) cannot be simply transposed to another. Likewise, social, cultural, and economic factors play a crucial role in the work environment, which suggests there is no one size fits all solution to the problem of extended working hours. Therefore, it is paramount to identify and examine the impacts of extended working hours on the oil and gas industry in other parts of the world.

To the best of the authors' knowledge, there is no case study on the impacts of extended working hours in the Sultanate of Oman. Hence, this study aims to address the research gap by examining the impact of extended working hours on the occupational health and safety of oil and gas workers in a selected oil and gas company in Oman. The study will identify and examine the risks and impacts of long working hours and present potential solutions to addressing the challenges in the industry in the country. We envision crucial insights into the peculiar nature, causes, and remedies to long working hours in the oil and gas industry in the country will be

presented.

## Methods

The study was a cross-sectional research design that employed a quantitative-method approach to examine the impact of extended working hours on the occupational health of workers at an undisclosed oil and gas company based in the Sultanate of Oman. The selected approach involved the collection, analysis, and interpretation of quantitative data recovered during the study. To this end, a simple questionnaire designed using Google™ forms was distributed online to the employees of the oil and gas company selected for the study. Data collection was done between January 25 and February 30, 2022. Ethical approval was obtained from the research and ethics committee of ICEM. Before administering the questionnaires to the respondents, information about the study and their voluntary agreement to participate in the study was also provided.

The sample size was determined using the Krejcie and Morgan Formular for determination of sample size.

$$n = \frac{X^2 NP(1-P)}{e^2(N-1) + X^2 P(1-P)} \dots \dots \dots \text{Equation (1)}$$

Where:  $N = \text{Population Size} = 140$ ,  
 $X^2 = \text{Chi Square Value} = 3.841$ ,  
 $P = \text{Population Proportion} = 0.5$ ,  
 $e = \text{Margin of Error} = 0.05$

$$n = \frac{3.841^2 \times 140 \times 0.5 (1 - 0.5)}{0.05^2(140 - 1) + 3.841^2 \times 140 (1 - 0.5)}$$

$$n = 128$$

Based on the sample size calculation 128 respondents were selected as the sample size.

The questionnaire consisted of 5 scaled statements based on the four-agreement or Likert scale of measurement. Hence, the scale was based on the following responses, namely, strongly agree, agree, neutral, disagree, and strongly disagree, along with an open-ended question at the end. The selected type of questionnaire has the advantage of obtaining detailed responses from responders as well as simplicity, flexibility, and cost-effectiveness. As part of the study, telephone calls

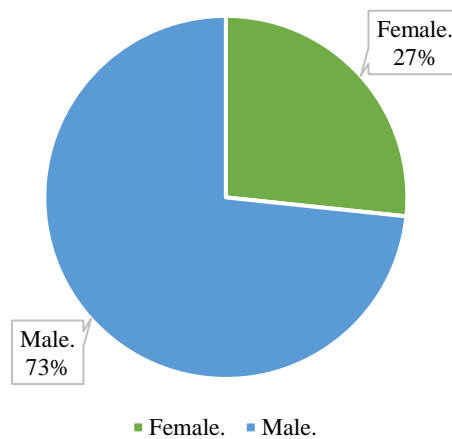
were also conducted with the managers of the human resources department (HRD) as well as the health & safety department (HSD) of the oil and gas company to solicit their request in taking part in the survey.

The study employed the simple random sampling approach to identify the target respondents at the selected oil and gas company in Oman. The method was selected to allow all employees of the company to contribute to the study as well as obtained balanced, first-hand, and unbiased views on the impact of extended working hours on their occupational health. Based on the approach, a total of 128 respondents were selected out of the 140 employees of the oil and gas company for the study. The sample size was achieved using the Krejcie and Morgan (1970) formula.

The objective of the study is to critically identify, assess, and highlight the occupational safety problems associated with extended working hours among workers at a selected oil and gas company in Oman.

### Results

Based on the study design, several questionnaires were administered to workers at the company to obtain their responses. The response rate for the questionnaires was computed at 91%, which indicates the respondents and management fully cooperated with the researcher during the study. As part of the study, the demographic statistics of the workers were collected and analyzed from the questionnaires. The gender-based distribution of the respondents in the study is shown below (Figure 1).



**Figure 1:** Gender-based distribution of the study respondents

The male employees at the company account for 73.0% of the total 128 respondents (who returned the questionnaires), whereas the females account for 27% of the total. The findings indicate that males outnumber females by a ratio of 2.75:1 at the company, which could be attributed to the nature and duration required for the job at the company. Typically, the long working hours and physical drudgery associated with such working environments are more suited for males as opposed to women. In addition, the higher number of males at the company firm could also be attributed to the risks associated with such work environments, which by extension also require certain skill sets and physical attributes

naturally lacking in females.

Based on the information deduced from the company's operations, selected tasks and working hours can also expose the staff to certain occupational and health risks. Typically, the extended working hours in the oil and gas environment expose workers to harmful or potentially dangerous substances ranging from noxious fumes, toxic solid materials, and hazardous liquids. The exposure of workers to such substances poses grave risks to their occupational health and safety. Studies have reported that exposure to such substances could result in cancer as well as respiratory illnesses and complications such as breathing problems.

Further inquiry revealed that the workers at the company were largely exposed to three main types of substances, namely hydrogen sulfide (H<sub>2</sub>S), silica materials/particles, and chemicals exposure (volatile organic compounds) on a period basis ranging from daily to monthly.

The statistics of the exposure durations of the workers to the outlined harmful substances are

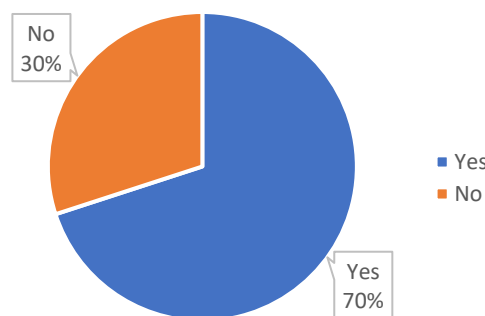
shown below (Table 1). As observed in the table, the duration of exposure to chemicals(constituents of SO<sub>2</sub>, Xylene, and Phosgene) accounts for 54.6% share of reported cases of exposure, which indicates it has the highest rate of occurrence among workers at the oil and gas company. The second and third places are occupied by hydrogen sulfide (H<sub>2</sub>S) and silica materials/particles that make up 13.6% and 31.8%, respectively.

**Table 1:** Exposure duration of workers to harmful substances

| Frequency    | Hydrogen Sulfide (H <sub>2</sub> S) | Silica Materials/particles | Chemical Exposure |
|--------------|-------------------------------------|----------------------------|-------------------|
| <b>N=128</b> |                                     |                            |                   |
| Daily        | 0%(0)                               | 33.0%(1.0)                 | 67.0%(2.0)        |
| Weekly       | 12.5%(1.0)                          | 25.0%(2.0)                 | 62.5%(5.0)        |
| Monthly      | 18%(2.0)                            | 36.0%(4.0)                 | 45.5%(5.0)        |
| <b>Total</b> | <b>13.6%(3.0)</b>                   | <b>31.8%(7.0)</b>          | <b>54.6%(12)</b>  |

The impact of extended working hours on the concentration of workers at the oil and gas company is shown below (Figure 2). The findings show that 70% (81.0) of the respondents agree that extended work can adversely affect workers' concentration. In contrast, 30% (35.0) responded that long periods of working have little or no effect and this cannot lead to low productivity or

compromise. However, the responses negate the contention that human beings require rest or breaks after reasonable periods of work during work to ensure full concentration or enhance performance or productivity. Typically, when employees work long hours, their productivity wanes and could result in poor quality output over time.



**Figure 2:** Impact of extended working hours on workers' concentration

The next section of the questionnaire then solicited responses from respondents about breathing problems they are faced with due to toxic exposure, the Impact of extended working hours on family life and also the effect of extended working hours on their performance at work. The

result is presented below (Table 2).

Section 1 of Table 2 shows the percentage share of respondents who reported breathing problems due to toxic exposure at the company. Based on the data in section 1, it can be deduced that 49.0% (63.0) of the respondents moderately agree that



breathing complications are caused by extended exposure to toxic gases, whereas 27.0% (35.0) are strongly in agreement. In contrast, the study also found that 12% (15.0) either disagree or are neutral that extended exposure to toxic gases causes breathing complications. The prevalence of breathing complications as well as other respiratory illnesses can severely impact the occupational health and safety of workers.

Section 2 of the table shows the respondent's views on the impact of extended working hours and toxic materials exposure on family life. As can be seen in Section 2, 54% (69.0) of the respondents agree whereas 15% (19.0) strongly agreed that extended working hours at the oil and gas company impact their family life. In contrast, the results revealed that 13%(17.0) disagree, while 18%(23.0) are neutral on the impact of extended working hours on their family life. In the same vein, the extended exposure of workers to harmful substances can result in protracted illness, which

will also deprive workers of quality time with family members.

Next, the workers were asked about the effect of extended working hours on their performance at work. As can be seen in Section 3 of the table, a mammoth 68.0% of the 128 participants' respondents either agree or strongly agree that extended working hours can compromise workers' performance. In contrast, 17% (22.0) and 15% (19.0) of the respondents disagreed or are neutral on the impacts of a long time on staff performance.

Next, the workers were asked about the effect of extended working hours on their performance at work. As can be seen in Section 3 of the table, a mammoth 68.0% of the 128 participants' respondents either agree or strongly agree that extended working hours can compromise workers' performance. In contrast, 17% (22.0) and 15% (19.0) of the respondents disagreed or are neutral on the impacts of long time on staff performance.

**Table 2:** Effects of Extended Working Hours

| Section | Effects of extended working hours                                  | Strongly agree % | Agree %         | Neutral %       | Disagree %      |
|---------|--|------------------|-----------------|-----------------|-----------------|
| 1       | Respondents who reported breathing problems due to toxic exposure. | 35.0<br>(27.0%)  | 63.0<br>(49.0)  | 15.0<br>(12.0%) | 15.0<br>(12.0%) |
| 2       | Impact of extended working hours on family life.                   | 19.0<br>(15.0%)  | 69.0<br>(54.0%) | 23.0<br>(18.0%) | 17.0<br>(13.0%) |
| 3       | Impact of extended working hours on Workers' Performance           | 22.0<br>(17.0%)  | 65.0<br>(51.0%) | 19.0<br>(15.0%) | 22.0<br>(17.0%) |

**Discussion**

The results indicate that subjecting employees to extended hours, as observed in the oil and gas company in this study, is a major health and occupation safety risk. The exposure to extended work exposes staff to the dangers of the oil and gas work environment of oil and gas. For example, the exposure of workers to oil and gas processes, products, and waste streams brings the staff in contact with toxic substances ranging from toxic or pollutant gases, solids, and liquid effluents. Other studies have reported that exposure to toxic substances in oil and gas fields or working environments is also dangerous and harmful to

the health of residents or local inhabitants of the regions where these installations are situated.<sup>21</sup> Wind and other natural processes can also convey toxic gas, substances, or particulate matter over long distances where they can accumulate and cause short- or long-term harm to humans, wildlife, and the environment.<sup>22</sup> Further analysis also revealed that extended exposure to toxic substances at work could result in direct and indirect challenges for workers. While the direct effects of extended exposure to toxic substances could result in occupational health and safety issues, there is also the likelihood of socio-economic challenges due to protracted illnesses or

even death in the medium or long term.

Exposure to these hazardous substances could result in severe health risks such as cancerous, nervous system, cardiovascular, and respiratory diseases particularly when inhaled by employees.<sup>9</sup> Various studies have also extensively reported on the relationship between long working hours and occupational health in the literature. Most of the studies have highlighted that long working hours have adverse effects on human health and well-being. The study by Okazaki et. al. reported that there is a positive relationship between working hours and both psychological and physiological health signs.<sup>23</sup> As a result, workers could become less productive and or resort to presenteeism and absenteeism.<sup>23</sup> Likewise, Shields reported that long working hours cause depression and behavioral health changes.<sup>24</sup> The correlation between long working hours and cardiovascular ailments has also been reported in the literature.<sup>25</sup> Similarly, meta-analytic studies have reported that extended working hours are associated with coronary diseases, and stroke, as well as serve as risk factors for metabolic syndrome, hypertension, and diabetes.<sup>23</sup>

The extended working hours experienced by oil and gas workers have impacts on their family life. Long periods at work mean that workers are separated from their loved ones which could put a strain on such relationships. The respondents in the study confirmed this with 69% confirming that long working hours affect their family life. Similarly, extended working hours expose staff to the dangers of the work environment even when health and safety measures such as PPE, and OSHE guidelines are set up or adhered to strictly. For accidents, secondary or runaway emissions of toxic substances over time could result in bioaccumulation and long-term exposure.<sup>26,27</sup> As a result, such workers could develop progressive, long term or terminal illnesses due to the buildup of the effects of the toxic substances. Numerous studies have examined the relationship between long working hours and health-related issues among employees.

Another effect of extended working hours on the

staff of the oil and gas company is the impact on concentration and performance arising from fatigue, stress, and loss of coordination among other factors. Due to such effects, workers may become demotivated, inefficient, or unproductive resulting in numerous outcomes. First and foremost, these effects could result in accidents, injuries, or even death in the workplace. Secondly, it could result in loss of productivity, which in turn could result in losses in the form of lost income/revenue or man hours for the company. Numerous studies in the literature examined the relationship between long working hours and productivity in the workplace. The study by Pencavel revealed that long working periods cause stress and fatigue which exert significant consequences on the output of workers.<sup>28</sup> Accordingly, the consequences include loss of productivity, high labor costs, and profitability in the long run.<sup>29</sup> Similarly, Karim reported that extended working hours have the potential to lower productivity, although the authors also opined that working for shorter (e.g., below 30 hours per week) does not inevitably result in enhanced efficiency.<sup>30</sup> However, another study by Okazaki et. al. revealed that long working hours also have some positive outcomes on productivity in the workplace provided this duration does not exceed the set threshold.<sup>23</sup> They reiterated that long working hours could lead to the condition termed "positive state of mind for work" and "work engagement", which leads to increased commitment and work productivity.

### **Conclusion**

The paper examined the impacts of extended working hours on the occupational health and safety of workers at a selected oil and gas company in Oman approach. Based on questionnaires, the opinions of the workers on the impacts of extended working hours at the company were sampled and analyzed using Microsoft excel and results were presented in pie charts. The results showed that extended working hours at the company have significant impacts on family life, performance, productivity, and health of the workers. It was observed that the extended

working hours could potentially expose the workers to dangers of the work environment which bring about numerous adverse effects on their occupational health and safety. For example, extended working hours could result in stress, fatigue, depression, and loss of concentration among others. In addition, it exposes workers to toxic emitted substances that could accumulate over time even in the presence of PPE and well-established health and safety protocols. The long-term bioaccumulated substances could result in various cardiovascular, coronary, respiratory, and nervous system disruptions and illnesses. Lastly, the study observed that the oil and gas working environments are not only dangerous and harmful to the health of workers but also to residents in the surrounding environment. Given the above, the study recommends that oil and gas companies establish new or revise old occupational health and safety guidelines to limit the work times, and durations (i.e., time spent at the workplace) through strategies such as shorter shifts, and longer breaks or leaves. Furthermore, long working hours should be prohibited except on special occasions or unavoidable circumstances to safeguard the health and well-being of staff which could ultimately enhance productivity and output.

### Recommendations

Based on the findings of the study, this study recommends that the occupational health of staff of the oil and gas company are prioritized. The establishment of appropriate health and safety measures will go a long way in ameliorating the status quo and preventing the potential effects of

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extended working hours on the health of workers. Workers are advised to refrain from long working hours except on special occasions or unavoidable circumstances. In addition, the working hour policies of the company will be to be revised by the management to improve the health, well-being and performance of the staff or employees. It is also believed that limiting work time, and duration (i.e., time spent at the workplace), as well as strategies such as shorter shifts, longer breaks, and leaves, could go a long way in addressing stress, fatigue, and depression and by extension enhance productivity and output. The management could take a step further by providing work guidance and counseling programs for staff who suffer from work-related psychological issues. In addition, it will reduce worker burnout, depression, stress, and fatigue. It is also recommended that fair work shifts, as well as good working conditions, are introduced to safeguard the overall health of the workers. Lastly, health and safety protocols that ensure early detection and warning signs for accidents and hazards must be provided along with PPEs, first aid, as well as medical care, and insurance for the workers. This approach could help to establish a good safety culture at the company. Several studies have reported safety performance can be improved with the establishment of an effective safety culture in organizations. These measures will enhance the health, safety, and well-being of staff at the company.

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