

# Effect of Occupational Stress on Health of Workers in the Oil & Gas Industry in Nigeria

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## Abstract

The research provides much sequence about occupational stress experienced by employees including those within the Oil & Gas industry. Subjective proof suggests that the effect of occupational stress on health is on the increase among workers of Oil & Gas industry in Nigeria. This study compared occupational stress experienced by Oil & Gas workers and civil servants. It also examined the effect of occupational stress on the health of workers. **Methods/Statistical Analysis:** Self-administered structured questionnaires were distributed among 497 randomly selected personnel of 2 case study companies operating in the Oil and Gas industry within Port Harcourt and its environs, as well as staff of the Rivers State Civil Service Commission (which was the control group). The responses were analysed using standard statistical software. **Findings** : The results of the study are insufficient to conclude that these health conditions lead to occupational stress; however, the strong correlations observed suggest a link between the reported health conditions and occupational stress, and the conditions could be exacerbated by occupational stress that employees of Oil and Gas firms experience. The conclusion is in line with the findings of previous studies which have reported adverse health effects due to prolonged or intense occupational stress **Applications/Improvements:** An annual programme of health surveillance should be established for early detection of work-related health issues among workers in the Oil & Gas industry. The findings of the study showed that high blood pressure and back pains were the likeliest adverse health effects of occupational stress in the Oil & Gas firms. Hence, health surveillance should specifically look out for these symptoms and the general symptoms of occupational stress.

KEY WORDS: Occupational stress, Health, Workers , Oil and Gas, Nigeria.

**INTRODUCTION:** The workplace of the 21<sup>st</sup> century is a fast-paced dynamic, highly, exciting environment which brings a huge number of benefits and opportunities to those who work within it. The oil and gas industry workers in Nigeria are faced with a lot of health problems due to the type of job hazards. Occupational Health is the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations preventing departures of health, controlling risks and the adaptation of work to people, and people to their jobs.

A major health challenge in occupational health is stress and stressful working conditions. Most of the oil and gas industry workers pass through different types of stressful conditions which affect their health . According to the current World Health Organization's (WHO) definition, occupational or work related stress "is the response people may have when presented with work demands and pressures that are not matched to their knowledge and abilities and which challenge their ability to cope."

According to the Oxford Advanced Learner's Dictionary 6th Edition, stress could among other things, refer to pressure, tension or worries arising from problematic situations in an individual's life. Where the trends of such stress are traceable to a job or work situation, it is known as job stress (Narayanan, 1999). As Narayanan (1999) further observe, job stress could in fact be identified with almost any aspect of a job or work situation such as extremes of heat, noise and light, or too much or too little responsibility etc. According to Irene (2005) job stress "is a pattern of reactions that occurs when workers are presented with work demands that are not matched to their knowledge, skills or abilities, and which challenge their ability to cope". Rajeev Patel et al noted that ,Occupational stress is a pattern of physiological, emotional cognitive, and behavioural responses that occur when workers are presented with work demands not matched to their knowledge, skills, or abilities and which challenge their ability to cope. Occupational stress is one of the major health hazards of the modern workplace. It accounts for much of the physical illness, substance abuse, and family problems experienced by millions of blue and white-collar workers. Occupational stress and stressful working conditions have been linked to low productivity, absenteeism, and increased rates of accidents on and off the job.

Stress at work is a relatively new phenomenon of modern lifestyles. The nature of work has gone through drastic changes over the last century and it is still changing at whirlwind speed. They have touched almost all professions, starting from an artist to a surgeon, or a commercial pilot to a sales executive. With change comes stress, inevitably. In most cases, job stress is attributable to negative situations such as a formal reprimand by one's superior for poor performance. Pleasant circumstances could also bring about job stress, such as job promotion and transfer to another location. Job stress has attracted considerable attention in recent times especially within the context of organizational behavior (Kazmi 2008; Shahu and Gole 2008; Nilufar2009). According to Sarda et al..Stress is the second largest occupational disease after musculoskeletal disorders. Stress accounts for 90 million lost work days annually in the US alone. \$150 billion is spent annually for psychiatric treatment, lost productivity and disability payments due to occupational stress related illnesses. Studies have shown that women are more likely to be victims of occupational stress than men (Kalkar171 ). Occupational stress is studied and treated by many disciplines and these disciplines have tended to define it, study it, and treat it in their separate ways many faces ,perhaps due to the interest the topic generates amongst people with ideal varying perspectives."It is necessary for all the interested parties to recognize that occupational stress is a real risk and one that is deeply rooted in the workplace, industrialists, workers and governments will have to step up preventive measures in this field. Good stress management practices in the workplace are required for tackling this ever increasing problem" (Anna Diamantopoulos European Commissioner for Employment and Social affairs).

Occupational stress occurs when a human being is incapable of meeting the demands required by his/her job, which cause suffering, uneasiness, behavioural changes, sleep disorders and negative feelings. Burnout is defined as a negative response to chronic occupational stress, which is described by the presence of three dimensions: a) emotional exhaustion, characterized by a lack of energy and depletion of resources, leading to feelings ranging from hopelessness, sadness, irritability all the way to physical symptoms such as weakness, headaches, nausea, musculoskeletal and sleep disorders; b) depersonalization, characterized by indifference, disengagement and alienation regarding social groups and

work; and c) reduced personal accomplishment at work, characterized by low productivity, making the individual feel unhappy and dissatisfied with his/her professional development. Over the years the oil industry has made a variety of contributions to the Nigerian economy. These include the creation of employment opportunities, local expenditure on goods and services, contribution to gross domestic product, contribution to government revenue, contribution to foreign exchange reserves, and the supply of energy to industry and commerce <http://www.ogbus.ru/eng/>

There is no single cause of job stress. Stress can be triggered by sudden, unexpected pressure; it is often the result of a combination of stressful factors which accumulate over time. Some people can become so used to the symptoms of excessive stress that it goes unnoticed to their detriment. Most occupational stress is related to management of work, relationships at work, organizational setup. The experience of stress is different for every person. Some people are affected more than the others, so what is stressful for one person may not be stressful for another. It can depend on your personality type and on how you have learned to respond to pressure.

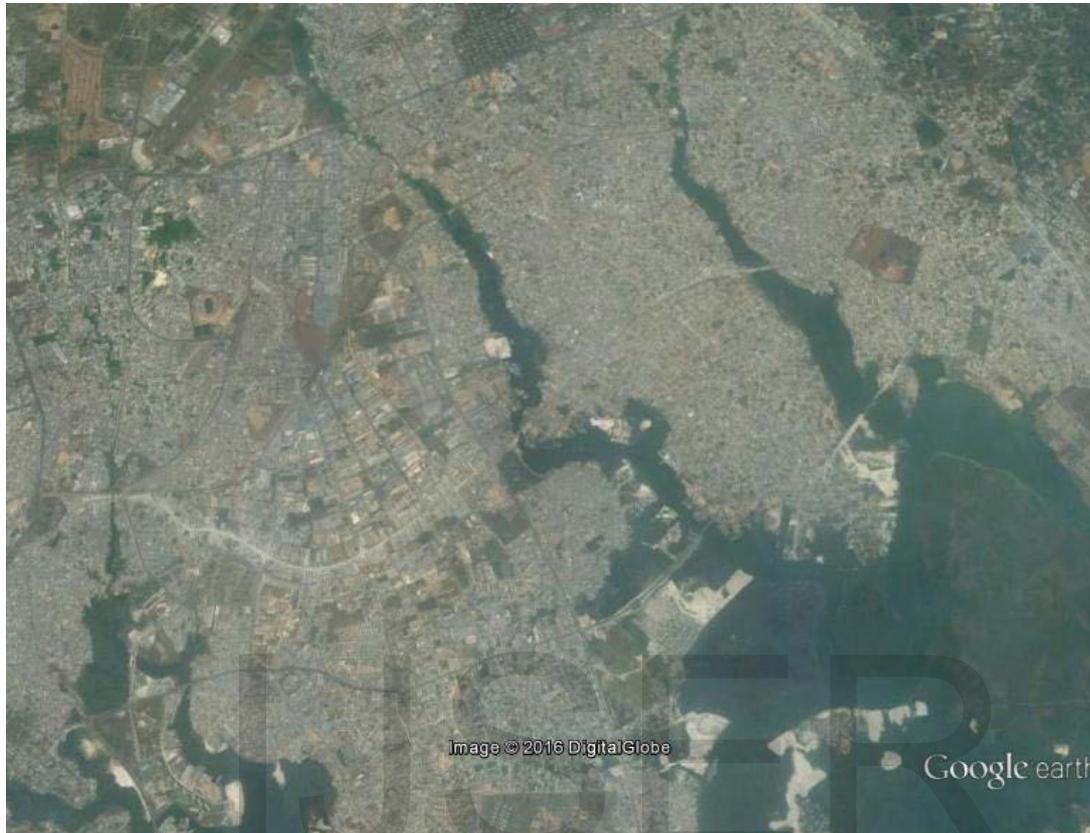
For most people, work is a significant and meaningful feature of life with the majority of them spending around 25% of their adult lives working. While work can provide people with structure, purpose, satisfaction, self esteem and spending power, the work place can also be a setting of stress and worry. Problems at work are more strongly associated with health complaints than are any other life stressor-more so than even financial problems or family problems. Many studies suggest that psychologically demanding jobs that allow employees little control over the work process increase the risk of cardiovascular disease. On the basis of research by the National Institute for Occupational Safety and Health and many other organizations, it is widely believed that job stress increases the risk for development of back and upper-extremity musculoskeletal disorders

The Nigerian industries and organizations needs to be properly scrutinized in occupational health and safety practices to prevent stressful health conditions. It is worthy to note that occupational stress among Nigerian industries could be better addressed if the effect of their health status are properly identified and evaluated.

## **ETHODOLOGY**

The study was conducted in Port Harcourt metropolis (4.8156° N, 7.0498° E) of Rivers State, Nigeria which includes the Greater Port Harcourt region covering Port Harcourt, Obio/Akpor,

Ikwerre, Etche, Oyigbo, Eleme, Okrika and Ogu/Bolo Local Government Areas of Rivers State (The Tide, 2012). Port Harcourt metropolis (see **Figure 1**) has a population of more than 1,000, 000 based on the 2006 National Population Commission figures (National Bureau of Statistics, 2006).



Source: Google, 2016

**Figure 1: Satellite Imagery of Study Area**

A sizeable population of Port Harcourt and environs are artisans, civil servants, and employees in various firms offering services in the Oil & Gas industry (Rivers State Ministry of Health, 2010).

### ***Data Collection***

The population of the study was composed of personnel of companies operating in the Oil and Gas industry in Port Harcourt and environs, as well as staff of the Rivers State Civil Service Commission.

### ***Sample and Sampling Technique***

The sample size was 497; made up of 242 females and 255 males from various departments/units in the respective case study firms (including the control group of workers within the Rivers State Civil Service). The respondents from case study 1 firm comprised of 72 females and 85 males; those from case study 2 firm comprised of 42 females and 124 males; and those from the control group were made up of 128 females and 46 males.

### ***Sampling Technique***

The study subjects were selected using random sampling technique. To collect the data, semi-structured questionnaires were prepared. Prior to questionnaire administration, conversations were held with selected respondents to explain the objective of the study.

Those respondents who were willing but not able to complete the questionnaire themselves were helped by data collectors. Approval for using the firms for the study and administration of questionnaires was obtained from authorized personnel at each company's health and safety department as well as top management representative.

### ***Inclusion and Exclusion Criteria***

The criteria for including participants in the study were: (1) within the legal working age (above 18 years); (2) working in the Oil & Gas sector (and the Rivers State Civil Service); and (3) resident in Port Harcourt and environs. The following groups of people were excluded from taking part in the study: (1) pregnant women were excluded because their physiological signs and symptoms are different from those of the general population. The physically challenged were also excluded from the study.

The Rivers State Civil Service was chosen as control because it is made up of workers from various units/departments employed in different sectors of the economy (for example, health, education, and engineering). The study participants were duly informed of the aim of the study including its objectives, and their consent was obtained prior to administering the study questionnaire. Questionnaire respondents were assured of their anonymity; they were not required to provide their names.

### ***Nature and Sources of Data***

Primary and secondary data were used in this study. The primary data were obtained by means of administered questionnaires and interviews with workers of the case study firms and the Rivers State Civil Service. Secondary data were obtained from existing literature on occupational stress among workers. The purpose was to examine research findings on the issue, identify gaps in the literature, and determine appropriate research focus to fill identified gap, and design research methodology to accomplish the task. The consulted literature includes research articles published in journals available in print and on the internet, books, and web searches.

### ***Methods of Data Collection***

Self-administered questionnaires were the main tools for primary data collection. Close-ended questions were used as this made the questionnaire easy for respondents to complete; 'yes/no' or 'not sure' questions were used. Open-ended questions were avoided as they are unsuitable for statistical analysis. The format of the questionnaire was in line with the standard for assessing occupational stress (as contained in the NIOSH Generic Job Stress Questionnaire).

The study questionnaire was piloted (between October 2015 and November 2015) prior to field data collection on randomly selected persons from the target population and individuals with experience in questionnaire design. The initial questionnaire was distributed via email and print among 12 persons out of whom 7 completed and provided feedback. The feedback was mainly on how respondents perceived certain questions and this informed their response. There was misunderstanding in differentiating between "fairly often" and "sometimes" as degrees of frequency of experiencing symptoms of stress. The issue was clarified through email, face to face and telephone communication. Once understood, respondents went on to complete the questionnaires. Feedback was also received on questionnaire format, logical arrangement of questions and vagueness. The feedback from this preliminary activity was used to improve the final product that was subsequently administered starting March 2016. The questions in the final version of questionnaire were therefore constructed to be clear and unambiguous as well as unbiased.

The questionnaires were mostly delivered online as attachment in email. Online delivery made it easier to reach more persons. A few survey forms were printed and distributed. A total of 660 questionnaires were distributed with 553 returned. The returned questionnaires

were sorted of which 56 were rejected because they were incomplete or responses were unclear. Those who submitted incomplete questionnaires were thanked for their time. They were not requested to complete fresh forms. The administered questionnaire assessed the respondents' job situation, any potential/actual work hazards, the physical work environment, and general health (including feelings about themselves). The questions were grouped in 2 sections:

- Socio-demographic information;
- General job information;
- Jobs situation;
- Work hazards;
- Physical environment;
- Non-work activities;
- Feelings about self;
- General health; and
- Health conditions.

**Data Analysis**

The data collected by means of the questionnaires were subsequently sorted and entered into Microsoft XLSTAT statistical software for generation of descriptive tables and charts as well as calculation of statistical parameters (for example, correlation and regression). The responses to questions on stressful conditions were rated in an attempt to quantify (and compare) the information provided by different respondents. The rating scale is shown in **Table 1**.

**Table 1: Rating Scale for Parameters**

<b>Psychosocial Characteristics</b>				
	Never	Occasionally	Fairly often	Very often
Rating	(0)	(1)	(1.5)	(2)
<b>Physical Environment</b>				
	TRUE		FALSE	
Rating	(1)		(0)	
<b>Non-Work Activities</b>				
	NO		YES	
Rating	(0)		(1)	
<b>Psychological Health (Feelings about Self)</b>				
Parameter	Strongly disagree	Disagree	Agree	Strongly agree
Rating	(0)	(0.5)	(1)	(1.5)
<b>Psychological Health (Recent Experiences)</b>				
	Sometimes (1-2 days)	Rarely (< 1 day)	Occasionally (3-4 days)	Most times (5-7 days)
Rating	(1)	(0.5)	(1.5)	(2)
<b>Medical Health</b>				
	Never	Occasionally	Fairly often	Very often
Rating	(0)	(1)	(1.5)	(2)
<b>Health conditions</b>				
	TRUE		FALSE	
Rating	(1)		(0)	

## RESULTS

A total of 660 questionnaires were distributed (220 for each of the 2 case study firms and control group). Four hundred and ninety-seven questionnaires were properly filled and returned with a response rate of 75%. The questionnaire assessed conditions that were likely to lead to occupational stress among respondents such as psychosocial characteristics of the job, physical environmental conditions, and non-work activities that could exacerbate occupational stress, as well as psychological and general medical health of respondents. The findings of the study as it pertains to health of workers are discussed in the succeeding sections (see **Table 2** for mean values of medical health and health conditions). Further, the Pearson's (linear) correlation coefficient for associations among the parameters was also determined.

**Table 2: Stressful Conditions**

Parameter	Case Study 1	Case Study 2	Control
	Mean (SD)	Mean (SD)	Mean (SD)
Medical health	0.16 (0.05)	0.14 (0.06)	0.07 (0.07)
Health conditions	0.09 (0.12)	0.11 (0.09)	0.04 (0.05)

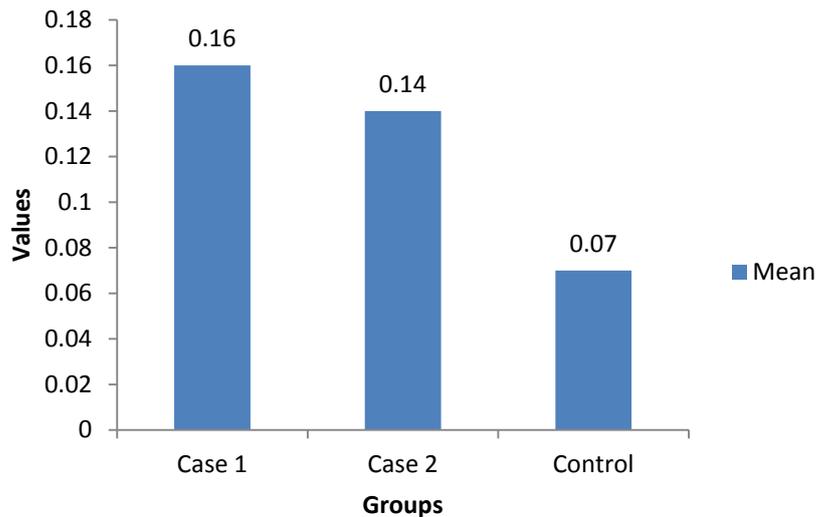
### Medical Health

The variation of medical health among the study population was conducted using ANOVA tool. A summary of the test of hypothesis for significant difference in the mean values for medical health among the 3 groups is presented in **Table 3**.

**Table 3: Comparison of Medical Health**

Summary						
Groups	Count	Sum	Average	Variance		
Case 1	157	24.71895	0.157446	0.002137		
Case 2	166	23.20915	0.139814	0.003304		
Control	174	11.56863	0.066486	0.004566		
ANOVA						
Source of Variation	SS	Df	MS	F	P-value	F crit
Between Groups	0.783557	2	0.391778	115.9919	5.03E-42	3.013973
Within Groups	1.668552	494	0.003378			
Total	2.452108	496				

With degree of freedom of 2 between groups, and 494 within groups, the F-statistic at 95% confidence is 116. Since this value is greater than F-critical (from standard table of F-distribution), we conclude that there was significant difference in the values for general medical health for the three groups. Given that the smallest pre-set level (P-value) of significance at which the null hypothesis of equal means would be rejected is 5.03E-42, the results are also significantly different at 99% confidence level. The values for the control group were significantly different from those of the case study firms (see **Figure 2**).



**Figure 2: Mean Values for Medical Health**

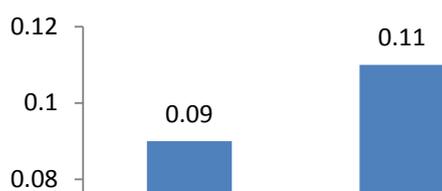
**Health conditions**

The values for reported health conditions among the 3 groups of case study 1, case study 2, and control group showed strong real positive linear correlations with medical health (which has been used as an assessor of occupational stress experienced by questionnaire respondents). The variation of health conditions among the study population was conducted using ANOVA tool. A summary of the test of hypothesis for significant difference in the mean values for health conditions among the 3 groups is presented in **Table 4**.

**Table 4: Comparison of Health Conditions**

Summary						
Groups	Count	Sum	Average	Variance		
Case 1	157	14.16667	0.090234	0.013952		
Case 2	166	17.83333	0.10743	0.008759		
Control	174	6.125	0.035201	0.002858		
ANOVA						
Source of Variation	SS	Df	MS	F	P-value	F crit
Between Groups	0.485167	2	0.242583	29.11263	1.12E-12	3.013973
Within Groups	4.116296	494	0.008333			
Total	4.601463	496				

With degree of freedom of 2 between groups, and 494 within groups, the F-statistic at 95% confidence is 29.1. Since this value is greater than F-critical (from standard table of F-distribution), we conclude that there was significant difference in the values of health conditions for the three groups. Given that the smallest pre-set level (P-value) of significance at which the null hypothesis of equal means would be rejected is 1.12E-12, the results are also significantly different at 99% confidence level. The values for the control group were significantly different from those of the case study firms (see **Figure 3**). The health conditions reported by respondents from the case study firms and control group are presented in **Table 5**.



**Figure 3: Mean Values for Health Conditions**

**Table 5: Reported Health Conditions**

Health Conditions	Case Study 1	Case Study 2	Control Group
Anaemia	X	X	
Arthritis		X	X
Asthma	X	X	X
Back problems	X	X	X
Diabetes		X	
Emotional problems	X	X	X
Gastritis		X	X
Heart disease	X	X	X
Hernia	X		
High blood pressure	X	X	X
Insomnia	X	X	X
Kidney disease	X	X	X
Lung or breathing problems	X	X	X
Ulcer	X	X	X

**Possible Health Effect of Occupational Stress**

The possible health effects of occupational stress on employees of the case study firms and control group organisation were determined using the set of matrix shown in **Table 6**. The matrix incorporates the psychosocial characteristics of employees’ work environments and the reported health conditions for each of the studied organisations. Though the physical environmental conditions of the work spaces could contribute to occupational stress, only psychosocial characteristics have been used in developing the matrix (and determining the health impact of occupational stress). This is because the findings of the study showed that physical conditions at the case study Oil and Gas firms did not contribute to occupational stress experienced by employees. Where the literature reports that occupational stress has been linked to a reported health condition, a value of 1 is entered in the table; where no link has been established/reported, a value of 0 is entered. Next, the potential health impact – that is, the possibility of the reported health condition to be due to occupational stress – is determined from the psychosocial characteristics and fraction of respondents who reported the health condition (in the table, the total number of respondents reporting the condition precedes the fraction in parenthesis).

**Table 6: Matrix for Possible Health Effects**

<b>Case Study 1 (n = 157)</b>				
	<b>Mean score for psychosocial characteristics (P)</b>	<b>Linked occupational stress? (L)</b>	<b>to Fraction of respondents (F)</b>	<b>Impact (P*L*F)</b>
Anaemia	0.38	0	38 (0.24)	0
Asthma	0.38	1	30 (0.19)	0.07
Back problems	0.38	1	104 (0.66)	0.25
Emotional problems	0.38	1	21 (0.13)	0.05
Heart disease	0.38	1	20 (0.13)	0.05
Hernia	0.38	0	20 (0.13)	0
High blood pressure	0.38	1	48 (0.30)	0.11
Insomnia	0.38	1	20 (0.13)	0.05
Kidney disease	0.38	0	20 (0.13)	0
Lung or breathing problems	0.38	1	14 (0.09)	0.03
Ulcer	0.38	1	20 (0.13)	0.05
<b>Case Study 2 (n = 166)</b>				
	<b>Mean score for psychosocial characteristics (P)</b>	<b>Linked occupational stress? (L)</b>	<b>to Fraction of respondents (F)</b>	<b>Impact (P*L*F)</b>
Anaemia	0.32	0	19 (0.11)	0
Arthritis	0.32	0	30 (0.18)	0
Asthma	0.32	1	28 (0.17)	0.05
Back problems	0.32	1	102 (0.61)	0.20
Diabetes	0.32	1	15 (0.09)	0.03
Emotional problems	0.32	1	41 (0.25)	0.10
Gastritis	0.32	1	15 (0.09)	0.03
Heart disease	0.32	1	15 (0.09)	0.03
High blood pressure	0.32	1	67 (0.40)	0.15
Insomnia	0.32	1	53 (0.32)	0.10
Kidney disease	0.32	0	14 (0.08)	0
Lung or breathing problems	0.32	1	28 (0.17)	0.05
Ulcer	0.32	1	11 (0.07)	0.03
<b>Control Group (n = 174)</b>				
	<b>Mean score for psychosocial characteristics (P)</b>	<b>Linked occupational stress? (L)</b>	<b>to Fraction of respondents (F)</b>	<b>Impact (P*L*F)</b>
Arthritis	0.31	0	5 (0.03)	0
Asthma	0.31	1	10 (0.06)	0.02
Back problems	0.31	1	147 (0.84)	0.26
Emotional problems	0.31	1	15 (0.09)	0.03
Gastritis	0.31	1	5 (0.03)	0.01
Heart disease	0.31	1	5 (0.03)	0.01
High blood pressure	0.31	1	22 (0.13)	0.40
Insomnia	0.31	1	39 (0.22)	0.07
Kidney disease	0.31	0	7 (0.04)	0
Lung or breathing problems	0.31	1	5 (0.03)	0.01
Ulcer	0.31	1	27 (0.16)	0.05

## DISCUSSION

The mean values for general medical health was highest for Case Study 1 and least for the Control Group. For all three groups the values of medical health showed positive correlations with those of psychosocial characteristics. This could indicate that psychosocial conditions within the Oil & Gas industry led to comparatively more medical health issues among workers than for those of the control group (that is, civil servants). The mean values for health conditions which respondents had been treated/diagnosed as having, was highest for Case Study 2, and least for the Control Group. For all three groups the values of health conditions showed positive correlations with each of psychosocial characteristics, and medical health.

The most prevalent health issues that were reported by employees of the case study firms were anaemia, asthma, back problems, emotional problems, heart disease, high blood pressure, insomnia, kidney disease, lung or breathing problems, and ulcer. These were also reported by employees of the control group organisation. The results of the study are insufficient to conclude that these health conditions lead to occupational stress; however, the strong correlations observed suggest a link between the reported health conditions and occupational stress, and the conditions could be exacerbated by occupational stress that employees of Oil and Gas firms experience. This conclusion is in line with the findings of previous studies which have reported adverse health effects due to prolonged or intense occupational stress. Some illnesses that have been associated with stress include heart disease, back pain, and gastrointestinal disturbances, as well as anxiety and depression (Johnson and others, 2005; HSE, 2001).

HSE (2003) reported that in extreme cases, occupational stress can lead to cancer, ulcers, asthma, diabetes, alcoholism and nervous breakdowns. Bickford (2005) reported high blood pressure, insomnia, gastrointestinal disturbances, and shortness of breath as illnesses associated with occupational stress. HSE (2006) reported back pain as another discomfort associated with stress. The present study showed that high blood pressure and back pain were the most significant adverse health impact associated with occupational stress among employees in Oil and Gas industry. Similar results were also observed for the control group (employees in the civil service).

## CONCLUSION AND RECOMMENDATION

The most prevalent health conditions that were reported by employees of the case study firms were anaemia, asthma, back problems, emotional problems, heart disease, high blood pressure, insomnia, kidney disease, lung or breathing problems, and ulcer. These were also reported by employees of the Civil Service. Further analysis showed that high blood pressure and back pain were the most significant adverse health impact associated with occupational stress among employees in Oil and Gas industry. Similar results were also observed for employees in the civil service.

An annual programme of health surveillance should be established for early detection of work-related health issues among workers in the Oil & Gas industry. The findings of the study showed that high blood pressure and back pains were the likeliest adverse health effects of occupational stress in the Oil & Gas firms. Hence, health surveillance should specifically look out for these symptoms and the general symptoms of occupational stress.

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