

Impact of Oil and Gas Extraction on Health in District Karak Khyber Pakhtunkhwa PakistanRafeed Ullah Khan¹, Mazhar Islam², Liaqat Ali³¹ PhD Scholar, The University of Peshawar Pakistan.² Assistant Professor & In-charge, Department of Sociology, Virtual University of Pakistan.³ Assistant Professor, Sociology, University of Veterinary and Animal Sciences, Swat Pakistan.**Abstract**

The present study was conducted in the district Karak, Khyber Pakhtunkhwa, Pakistan and the sole aim of the study was to find out the impact of oil and gas extraction on the local communities. Data were collected from 376 respondents in six village councils of the district Karak. The results revealed a significant association was found between social developments and the contaminated water produced at the time of Oil and gas discovery causes health hazards for the people of communities ($p = .000$). The findings also indicated that Local area has witnessed fatal diseases like cancer after explorative activities. During Oil and Gas extraction, polluted water is produced in large amount and is released into the sources of clean and drinking water, which may cause damage of agriculture, wild life and different diseases like cancer and respiratory diseases may also erupt in local people. Therefore, there is strong need for government to address these issues and enforce effective environmental regulations to protect clean water sources, biodiversity, and ecological balance.

Keywords: Health hazards, Oil and gas extraction, Public Health, Environmental Pollution.

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1. Introduction

The word petroleum used for oil and gas collectively, and regarded as fossil fuels because it is imagined that both were formed from the buried dead body of animals and plants before long period (million years ago) died (Chapman and Sheehan, 2003). Natural gas is a mixture of dissimilar substances, such as methane gas, alkane, carbon dioxide, nitrogen and helium, which are used for different purpose such as heating of room, cooking of meals and food, formation of electricity and transport purpose. It is also used in the process of making plastics and other organic substances and for running different machines in factories (Stellman, 1998). Oil is a greasy fluid and a mixture of alkanes, nitrogen, cycloalkanes, sulfur, iron etc. (Sivansankar B, 2008). Oil may be found in different colors i.e. yellow or red, green, and mostly in dark brown color (Guarina and Medjimurec, 2014).

The segment of oil and gas divides into two activities. One is upstream activities (industry) which is related to the process of exploring, making and to conveying of oil and gas to the dispensation facility, where unwanted substances can be removed. The other is downstream activities which are related to making, sharing process and selling of hydrocarbon goods (Barclays Bank, 2015).

From the very beginning natural gas has been used as a mean of electricity, natural gas declare itself positively and often forcibly as an advantageous primary source of energy, that is why it is used instead of oil now a day (Rolo et al., 2008). One of the important effects of natural gas is that it is environmentally friendly sources of energy because it sending out less carbon dioxide as compare to coal etc., due to which the chances of pollution of environment is very less (shahbaz et al., 2014). These benefits are inviting various states towards the use of natural gas as an alternate mean of energy production. (Apergis et al., 2010). Oil has first position as a source of energy in the world, while natural gas has a second position (Cabral et al., 2013).

States such as Qatar, Bahrain, Oman, Kuwait, Saudi Arabia and the United Arab Emirates (UAE) made a council known as Gulf Cooperation Council (GCC). Although these states are differing from one another in population and also in territories, but they are situated very near with one another in the location of Middle East. Therefore, they are dependents on one another for the purpose of International Security, needs, protection and Trade especially oil and gas (Gulf Cooperation Council, 2016). These six nations have a large number of oil and gas, which is a main source of their economy and these six nations carry away extra oil and gas to other nations on a low price as compare to other nations. Moreover, Qatar, Kuwait, UAE and Saudi Arabia are main supporters of the organization of the Petroleum Exporting Countries (OPEC), came into being in 1960. Here oil and gas especially oil occurring in large amounts, so oil is a great source of energy and economy, environmentally friendly, have higher heating capacity and cheaper than other resources. However, oil burning emits more carbon dioxide as compare to gas, give harm to human health, environment and ecosystem. (OPEC: Brief History, 2016).

The exploration and yield of oil and gas have provided opportunities for jobs while on other side natural resources further effects health conditions of the local people (Rosser, 2006). The health problems are also due to exploration of oil and gas in Nigeria. This includes an increase in average share of individuals diagnosed with chronic diseases, particularly those related to the respiratory, digestive, cancer and urinary system (Collier and Hoefler, 2002).

The people who live in the areas, where natural resources occur, have been affected negatively, which also has a dangerous effect on the conditions of health of people (Collie, 2003). Some countries like

Tanzania, where natural resources occur in abundance, still majority of people are poor. On one side their health conditions are bad due to oil and gas exploration, and on the other hand they do not get proper benefits as to be due to oil and gas discovery, so people are not able to go to hospitals for proper treatment. In a small no people get off full advantages from the natural resources and the rest of the people are deprived by them through social reason (poverty). This problem mostly occurred in African countries at the time of colonialism and imperialism. But the imperialist cannot be criticized forever for the backwardness happened presently and in future. Now a day Tanzania is in the state of development, with imperialist techniques. The imperialist tries to give pleasure to the people by the use of power (Mkonda & He, 2017). In fact, from 2000 up to 2008 increase in the prices of oil was only for one purpose just to bring development in GCC states. But additionally, it compelled the government to spend some of the savings on subsidies, social activities and to boost the health and development, just like Saudi Arabia used more resources upon education to reduce the burden of jobless. (Factbook: Saudi Arabia, 2016).

Literature Review

Health Effects

Selber (2013) stated that any abnormality in the usual functions and activities in human body because of an outer agent or stimuli. (Johnston, Lim, & Roh, 2018), reported that extraction of oil, refineries and carrying of fuel from one area to another area in tanks or pipelines may cause pollution which may be very dangerous to human health, Marine and ecosystem in the relevant region. The oil refineries factories, which are constructed by people who do not have the information of the threats of these activities in the relevant area. These oil refineries may cause problems of health just like skin allergies, cancer, eye problem and diseases related to respiratory system. Oil spills can cause pollution of drinking water.

A UNEP (2009); report directs that due to the exploration of oil and gas increase also occurred in the health risks which is more observed in the developing countries. For example, in the Niger Delta people faced many problems, such as lung diseases, skin spots, coughing, tumors and cancers. The UNCTAD (2007) report indicates that; in Jesse the village of the Niger Delta Blasts from pipelines caused injuries and deaths over of 700 local people, in October 1998. Moreover, the invasion of migrant people also causes health risks to local people through the induction of new diseases.

Hurtig and Sebastian (2005); also reported that the occurrence of different diseases which can be fatal for the local communities such as cancer, lung diseases, eye diseases and tumor is relatively higher in the people who lives near to oil reserves in the countries where oil and gas exploitation activities occurred for over 20 years. They gave the example of Ecuador, where they note that these diseases were observed in the people less than 10 years. (Johnston, Lim, & Roh, 2018) stated an additional problem mostly in locations close to oil reserves that is the comparatively weaker health of the community members. The greater part of literature gives information about the effect of oil finding and exploration is the declining health status of those people who lives near to oil reserves in the developing countries.

Kaladumo and C. O. K. (1996) stated that gas flaring might cause health threats connected with air pollutants in the Niger Delta, such as the worsening of asthma, raised respiratory patients in hospital, long-lasting lung problems and bronchitis. He told about two most main elements of air contamination which can create problems for human health, one is ozone and the other is acid aerosols. He gives the proof of the Canadian research on animals.

2. Method

This study employed a quantitative cross sectional survey design to examine the effects of oil and gas activities on the health conditions of residents in District Karak, Khyber Pakhtunkhwa, Pakistan. At first stage Banda Daud Shah Tehsil was selected randomly then three union councils (UCs) were selected from the selected Tehsil namely, Gurgori, Teri and Jatta Ismael khel respectively, furthermore two villages of each selected UCs were selected for data collection on random basis. The head of each household was the potential respondent for this study. For sample size proportional allocation formula was used where out of total 15198 population of the aforementioned villages, a sample of 376 heads of households were the determined selected sample for getting information on the basis of criteria, adopted by Sekaran (2003). The data was analyzed through Uni variate and Bivariate level at the first stage. Univariate analysis was made to find out the frequency and percentage, while at second stage, bivariate analysis was made to find out the association between the dependent variable, social development and the independent variable, health effects.

The formula used to compute Chi-square is as following:

$$\chi^2 = \sum_{i=1}^r \sum_{j=1}^c \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$$

3. Results

Uni Variate Analysis

Health effects

A sound health may be able for carrying out all major activities on part of human making them distinct from the other human beings. A healthy person with skillful mind may thwart any untoward event, challenging his peaceful environment. Peaceful and congenial environment with maximum participation of its member entails the process of social development.

Table 1 showed the first statement results regarding the health effects, and disclosed 96.8 percent amongst the respondents were of the opinion that pollution caused at the time of oil and gas discovery leads to health diseases in local people, 2.4 percent negated and 0.8 had no knowledge regarding the statement. Based on these findings it is attributed that any sound policy regarding the entailment of pollution through exploration did not exist. All parameters of precautions if met may make the exploration as a sound and friendly phenomenon. These findings were also supported by (Johnston, Lim, & Roh, 2018) who argued that exploration of oil and gas refineries and carrying of fuel from one area to another area in tanks or pipelines may cause pollution which may be very dangerous to human health.

Moreover, 97.1 percent of the respondents disclosed that the contaminated water produced at the time of oil and gas discovery causes health hazards for the people of communities, 2.1 percent answered no while 0.8 percent answered didn't express their views. These results were in accordance to the preceding statement that necessary precautionary measures to protect human lives were missing. These findings were closely related with the findings of (Kponee et al., 2015) who argued that one of the major reasons for the pollution of water is explorative activities of oil and gas. Such contaminated water has negative effects on human health as it is to be used for animal and human drinking.

In addition, 92.3 percent of the respondents answered yes to the statement that explosions from pipelines some time have dangerous effects for local people, emanated in the form of some chronic diseases, 7.4 percent answered no while 3 percent answered with uncertainty. These findings indicated that substandard pipes are laid out or its fixing has been a problem, which could be mechanical in nature. These statements were also in lines to the literature by United Nations Conference on Trade and Development UNCTAD (2007) which indicated that if the pipes of the oil and gas are not protected properly then there are a lot of chances of explosion. As in the Niger Delta blasts from pipelines caused injuries and deaths to over of 700 local people. Similarly, 89.1 percent of the respondents were in favor of the statement that local area has witnessed some fatal diseases like cancer after explorative activities, 8.2 percent were not in favor of the statement while 2.7 percent didn't know about the statement. These findings are directing towards the existence of fatal diseases, might be the result of explorative activities. During the exploration water and soil texture completely undergo changes. These changes are usually not favorable to human and animal, as it destroys the aerobic diversity of the area, leaving the environment and local product not ideal for human use. These findings were in close liaison to Hurtig and Sebastian (2005) they argued that those regions where exploration of oil and gas occurred for a long period of time. There the local people may suffer from different types of dangerous diseases such as cancer, tumor and other respiratory diseases. Furthermore, 95.7 percent of the respondents were of the opinion that oil spills have caused pollution of drinking water and 4.3 percent negated. These findings further augment the outcomes, surfaced in the preceding conclusion. Based on these findings it is assumed that spilling of oil should be avoided, so that its dangerous effects on local people may be minimized. These findings were in accordance to (Kponee et al., 2015) who stated that during discovery of oil a lot of dangerous material is exposed towards the sources of clean and drinking water which pollutes that water.

Similarly, 96.3 percent of the respondents answered yes to the statement that respiratory diseases are also in rise to consistent exploration activities, 3.5 percent answered no while 0.3 percent answered didn't know. This finding is supported by Kaladumo and C. O. K. (1996) stated that during explorative activity flaring of gas is a common phenomenon, which is also a cause of air pollution and may cause respiratory diseases.

Bi- Variate Analysis

Association between Social Development and Health Effects

Health embodies the physical characteristics along with mental health as well. Both are integral components of human personality, if collectively applied may lead to social development in light of people maximum participation in social process.

Table 2 displayed an association between social developments as dependent variable with effects measured on health as independent variables i.e. health effects. The table indicated a non-significant association ($P=0.414$) exhibited between pollution caused at the time of oil and gas discovery leads to health diseases in local people and social development. These results were indicator of the fact that pollution, being caused by activities of discovery is controlled by executing agencies. These results findings were supported by (Johnston, Lim, & Roh, 2018) argued that discovery of oil and gas and its carrying process from one place to another place by tankers and pipes may cause pollution for local people due to tankers accidents and pipe leakage which are very harmful for human health.

Table 1
 Respondents' Perceptions of Health Effects from Oil and Gas Activities

S. No	Statement	Yes	No	Don't know	Total
1	The pollution caused at the time of oil and gas discovery leads to health diseases in local people.	364(96.8)	9(2.4)	3(0.8)	376(100)
2	The contaminated water produced at the time of Oil and gas discovery causes health hazards for the people of communities.	365(97.1)	8(2.1)	3(0.8)	376(100)
3	Explosions from pipelines some time have dangerous effects for local people, emanated in the form of some chronic diseases.	347(92.3)	28(7.4)	1(0.3)	376(100)
4	Local area has witnessed some fatal diseases like cancer after explorative activities.	335(89.1)	31(8.2)	10(2.7)	376(100)
5	Oil spills have caused pollution of drinking water.	360(95.7)	16(4.3)		376(100)
6	Respiratory diseases are also in rise to consistent exploration activities.	362(96.3)	13(3.5)	1(0.3)	376(100)

Table 2
 Association of Health Effects with Social Development

Statements	Respondents Perception	Social development			Total	Chi-Square(P-Value)
		Yes	No	Don't know		
The pollution caused at the time of oil and gas discovery leads to health diseases in local people.	Yes	169(44.9%)	7(1.9%)	2(0.5%)	178(47.3%)	$\chi^2=3.939$ P (0.414)
	No	192(51.1%)	2(0.5%)	1(0.3%)	195(51.9%)	
	Don't know	3(0.8%)	0(0.0%)	0(0.0%)	3(0.8%)	
	Total	364(96.8%)	9(2.4%)	3(0.8%)	376(100%)	
The contaminated water produced at the time of Oil and gas discovery causes health hazards for the people of communities.	Yes	172(45.7%)	6(1.6%)	0(0.0%)	178(47.3%)	$\chi^2=20.503$ P (0.000)
	No	191(50.8%)	1(0.3%)	3(0.8%)	195(51.9%)	
	Don't know	2(0.5%)	1(0.3%)	0(0.0%)	3(0.8%)	
	Total	365(97.1%)	8(2.1%)	3(0.8%)	376(100%)	
Explosions from pipelines some time have dangerous effects for local people, emanated in the form of some chronic diseases.	Yes	169(44.9%)	9(2.4%)	0(0.0%)	178(47.3%)	$\chi^2=4.191$ P (0.381)
	No	175(46.5%)	19(5.1%)	1(0.3%)	195(51.9%)	
	Don't know	3(0.8%)	0(0.0%)	0(0.0%)	3(0.8%)	
	Total	347(92.3%)	28(7.4%)	1(0.3%)	376(100%)	
Local area has witnessed some fatal diseases like cancer after explorative activities.	Yes	169(44.9%)	9(2.4%)	0(0.0%)	178(47.3%)	$\chi^2=24.174$ P (0.000)
	No	164(43.6%)	22(5.9%)	9(2.4%)	195(51.9%)	
	Don't know	2(0.5%)	0(0.0%)	1(0.3%)	3(0.8%)	
	Total	335(89.1%)	31(8.2%)	10(2.7%)	376(100%)	
Oil spills have caused pollution of drinking water.	Yes	166(44.1%)	12(3.2%)	0(0.0%)	178(47.3%)	$\chi^2=5.159$ P (0.076)
	No	191(50.8%)	4(1.1%)	0(0.0%)	195(51.9%)	
	Don't know	3(0.8%)	0(0.0%)	0(0.0%)	3(0.8%)	
	Total	360(95.7%)	16(4.3%)	0(0.0%)	376(100%)	
Respiratory diseases are also in rise to consistent exploration activities.	Yes	169(44.9%)	8(2.1%)	1(0.3%)	178(47.3%)	$\chi^2=2.284$ P (0.684)
	No	190(50.5%)	5(1.3%)	0(0.0%)	195(51.9%)	
	Don't know	3(0.8%)	0(0.0%)	0(0.0%)	3(0.8%)	
	Total	362(96.3%)	13(3.5%)	1(0.3%)	376(100%)	

In addition, the contaminated water produced at the time of oil and gas discovery causes health hazards for the people of communities as was found highly significant (P=0.000) with social development. The water profile as being under threats of pollution as indicated by these results, water contamination is the result and outcome of drilling activities,

which the study area also witnessed. These findings were supported by (Johnston, Lim, & Roh, 2018) who stated that according to a report of World Health Organization, the discovery of oil and gas may result into the water, land and air pollution, which are harmful for human being. So,

the health of the local people who are living near to the oil and gas reserves is comparatively weaker and may suffer in different diseases. Contrary to the above, a non-significant association ($P=0.381$) was confirmed between explosions from pipelines some time have dangerous effects for local people, emanated in the form of some chronic diseases with social development. These findings however, were supported in the literature by United Nations Conference on Trade and Development UNCTAD (2007) which stated that due to non-protection of pipelines and letting of fire near the pipelines of oil and gas may cause explosion, due to which death and injuries may occur. The same case was happened in Niger Delta.

Contrary to the above, a highly significant association ($P=0.000$) existed between local area has witnessed some fatal diseases like cancer after explorative activities and social development. Based on these results it could be attributed that during explorative activities the companies must work under some of the rule and regulation, due to which most of the diseases may be controlled. However, these controlling parameters were not applied which resulted into the emergence of fatal diseases like cancer and other respiratory diseases. These findings were also supported by Hurting and Sebastian (2005) they argued that the area where explorative activities occur their fatal diseases like tumor, cancer and other chronic diseases can be observed amongst the local members. They explored that in the people of Ecuador; the above diseases were relatively higher as compare to other people because they were very close to oil and gas reserves. However, a non-significant association ($P=0.076$) was found between oil spills has caused pollution of drinking water and social development. The result of this research is in accordance to Haque et al., (2006) who argued that during explorative activities oil and other different wastes both in solid and liquid forms are thrown into rivers and other drinking water reservoirs, due to which the water is polluted and unsafe for use, which is a harbinger to a number of fatal diseases.

Similarly, a non-significant association ($P=0.684$) was found between respiratory diseases are also on rise to consistent exploration activities and social development. Based on these on these findings it is suggested that respiratory diseases are not primarily caused by the exploration of gas and oil reservoir as there were more causes of respiratory diseases in terms of unhealthy environment. These findings were negated by the report of United Nations of Environmental Program UNEP (2009) which opined that the regions where permanent exploration of oil and gas occurs have the tendency of health risks. These possibilities are more in the developing countries, like Niger Delta, where in local people different diseases like cancer, tumors, skin diseases and respiratory diseases were very commonly observed.

Conclusion:

This study examined the health impacts of oil and gas exploration activities in District Karak Khyber Pakhtunkhwa Pakistan. The finding shows that large number of populations perceived the pollution and contaminated water cause a serious health issue in the region. A statistically significant association was found between contaminated water and health hazards and between explorative activities and fatal diseases, indicating serious environmental and public health risks. These results highlight the need for effective environmental governance a strictly policy fir oil and gas producing areas. Government should focus to established monitoring system to dump the wasting materials properly and also allocate funds for local health care system.

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