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Original Research Article

Al-Qassim industrial area and its role in changing the diseases patterns among workers over the past five years (2011-2015)

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ABSTRACT

Background: Rapid growing in the economy in Saudi Arabia was observed in the last ten years, an increase in industrial growth rate, followed by an increase in the number of new workers, which requires further action for, prevention and control of occupational health.
Methods: This was a descriptive- retrospective study depended on the medical records of employees who attending Qassim Industrial area, from the year 2011 to 2015. The study aimed to evaluate the role of industries in changing the diseases patterns among workers over the past five years and to assess the distribution of these patterns among the different types of industries. Samples were selected from the 25 factories, it represented the most common and hazardous industries in the region. Medical records used were only the records in a health center in the area. The study included workers in different sections of the factories. All of the team members were oriented about the objectives and other issues related to the study.
Results: The study showed a marked increase in the overall prevalence rate of non-communicable diseases under the study (cardiovascular diseases, eye, derma, respiratory infection, hearing, impairment, and diabetes) from 7.1% to 15.7% from the year 2011 to 2015.
Conclusions: A marked increase in the overall prevalence rate of studied non-communicable disease shown from the year 2011 to 2015, comparing with the year 2011 when respondents joined their work, while no changes in the nature of the disease and no new unspecified types of diseases were recorded.

Keywords: International labor organization, Medical records, Occupational, Qassim industrial area, Patterns, Workers, Workplace safety, Work environment

INTRODUCTION

Occupational diseases and accidents are considered the most common causes of injuries and deaths among workers each year, it is about two million cases a year among all workers in the world. International Labour Organization (ILO) and the Arab Labor Organization decided to hold a workshop in November 2007 in order to conduct a study presented the background of the development of occupational health and safety in the 18 Arab countries which are: Algeria, Bahrain, Egypt, Iraq, Jordan, Saudi Arabia, Kuwait, Lebanon, Libya, Morocco, Oman, Palestine, Qatar, Sudan, Syria, Tunisia , the United Arab Emirates ,Yemen and the United Arab ,the results of that study showed that health and safety conditions in the Arab countries vary from one country to another and that some countries suffer from serious gaps

in occupational health and safety and performance mechanisms.[1] The main barriers to occupational health and safety improvements include delay the ratification of the ILO Conventions on occupational health and safety, and the lack comprehensive and detailed information on occupational health and safety in domestic legislation, and the absence of national policies and programs on occupational health and safety in addition to the weak enforcement of regulations relating to occupational health and safety.[2]

Other barriers that prevent the strengthening of national programs are inadequate reporting process to cover the compensation, and the lack comprehensive and accurate data on occupational accidents and diseases, also no involvement for the tripartite advisory bodies in the occupational health and safety when planning and making a decision related to occupational health and safety. In addition to that, many countries suffer from a lack of local expertise in the field of occupational health and safety. The number of inspectors and experts in the field of occupational health and safety is very small, making it difficult to implement occupational health and safety program successfully.[3]

During the past five years, modest progress has been made, but it was important and vital- however, it applied in several countries to varying degrees. For example, the situation has improved in the Gulf countries where the Council of Ministers of Labor and Social Affairs and the Gulf Cooperation Council is making unremitting efforts in this regard.[3]

Occupational health in Saudi Arabia

In the last fifty years, the Kingdom of Saudi Arabia is witnessing a major development in economic and industrial fields. The development in the industrial activity was accompanied by the introduction of modern machinery, equipment, and chemicals, which pose many chemical, mechanical, physical and other types of risks.[4]

A development has led to an increasing number of factories in various fields of production and doubled the number of workers in these factories.

Interest in the concept of occupational health in the Kingdom of Saudi Arabia was started after the oil drilling operations, where increased numbers of Saudis and non-Saudis workers engaged in work with the concessionaire companies' wire, risks to workers was the most important issues that need to protect. The first organization in the reign was released by King Abdul Aziz in 1356 H, corresponding to 1937 under the title: (compensation industrial, technical project workers) system, which identified the employer's responsibility arising from work injuries.[5]

All local and regional laws and regulations adopted by the Kingdom of Saudi Arabia were following the international health and safety laws, taking into consideration the other local factors related to the environment ,culture,……etc. The most common resources were-

- Section 8 of the Labor Law on the protection of business risks, and major industrial accidents, social and health services.
- Section 12 of the Labor Code on working in mines.
- Section 13 on labor inspection, including occupational health and safety inspection
- Section 18 of the law on social security coverage in cases of occupational hazards.[6]

Table 1: legislative and implementing occupational health and safety authorities.[6]

Country	Legislative authorities	Executing authorities
Saudi Arabia	The Ministry of Labor	The Ministry of Labor
	Ministry of health	Ministry of health
	Social Security Foundation	Social Security Foundation
	civil defense	civil defense
	The Ministry of Municipalities and Rural Affairs	The Ministry of Municipalities and Rural Affairs

The Ministry of Labor deals with the development and use of the Kingdom's human resources. It is responsible for workforce planning, labor relations and the general monitoring of all matters relating to employment affairs. This Ministry also deals with labor disputes, employment in the private sector and labor visas.[7]

The Saudi government has for many years been of the view that occupational health should be synchronized and deliver by the government in the same approach as any other safety and health related issue. Recently, there have been shift in the Kingdom of Saudi Arabia to take a far more holistic approach to workplace safety and health, focusing on the wider wellbeing and health program shifting towards adaptation of best practices for Saudi people.[7]

Everly (1986) in point out the liability for implementation of the workplace safety is employer duty. Also, Roughton (2010) have the same opinion with idea that it is the employer main responsibility and obligation to prevent all workplace accidents and prevent such incident. Therefore, the employers have a legal responsibility to protect the safety and the health of their employees as been mention in the article of the Hazardous Work (2012). Unfortunately; pertaining to this issue many of Saudis' employers may perhaps ignoring, either unintentionally or otherwise, their legal and ethical obligations toward their employees.[8]

The Royal Decree No.M/21 dated 6 Ramadan 1389 (1969) , clearly pointed out that Ministry of Labor, Ministry of Commerce and Industry in Saudi Arabia are equally obligated to reduce the number of skilled workers loses their jobs every year due to the workplace injuries and safety to be at its minimum level possible.[9]

Statistical data about occupational injuries and diseases in KSA

Occupational injuries and diseases (OID) are major and often preventable health problems in the work environment. There were almost 360,000 fatal occupational accidents in 2003 and almost 2 million fatal work-related diseases in 2002 throughout the world. Every day more than 960,000 workers get hurt because of accidents. Each day 5,330 people die because of work-related diseases.[10]

Due to lack of proper recording and notification systems, the official numbers of occupational accidents and work-related diseases are missing for many countries especially companies in developing countries that are not familiar with occupational safety and health.[10]

Table 2: Occupational injuries and diseases by main economic activity in KSA statistical data.[11]

Economic activity	Workers	All injuries & diseases
Mailing and telecommunication	442343	10877
wholesale and retail trading	5161649	121747
Construction	4804818	188695
Mining and quarrying	406531	5678
Social service	1960145	17442
Agricultural and fishing	213537	3963
Transforming industries	1705813	92590
Water and electricity	283429	6534
Financing and real-estate	502761	3315
All	15481026	450841

Data and field information are not available in details for most areas of occupational health in K.S.A although daily reports may be written internally in the factories. Also, researchers are not common for reasons of confidentiality of information transactions in the private sector, since most of the health problems and non-compliance with health rules are more common in private sectors rather than giant governmental institutions.

Little data are available showing some increasing in the occupational diseases because of increasing the number of industry area.

Results of some statistical data collected by (Elshinnawey* and Nabil A Othman) with mean for five years are shown in the Tables 2 and 3.

Table 3: Nature of occupational diseases.[11]

Nature of occupational diseases	All injuries or diseases
Eye injuries & diseases	32090
Infectious & parasitic diseases	12700
Skin diseases & dermatitis	3368
Respiratory & pulmonary dust disorders	1573
Behavioral diseases	989
Neoplasm	93
Total	450841

Other data presented in International Seminar on "Social Security: about the Challenges of Sustainability "Abu Dhabi, United Arab Emirates, 27-29 March 2012 showed Decrease in a number of dangerous injuries & number of deaths during the period of 2001 – 2011 (1422H – 1432H).[12]

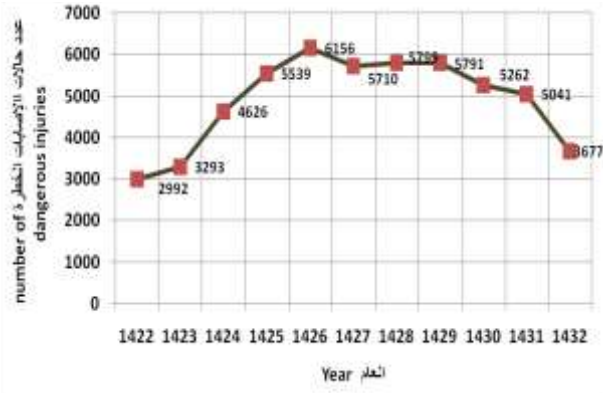

Figure 1: Challenges of sustainability.

Objective of the study

The study aimed to evaluate the role of industries in changing the diseases patterns among workers over the past five years and to assess the distribution of these patterns among the different types of industries.

METHODS

Study design

A descriptive- retrospective study depended on the medical records of employees attending Qassim Industrial area, in the beginning of the last five-year period. Stratified Samples were selected from the 25 factories, it represented the paints industry, Glass industries, and plastic industries, and these are the most common and hazardous industries in the region. Medical records used were only the records in the health center

in the area. The study included workers in different sections of the factories who joined the work in 2011 or during that time and remain at the work at the same institution or retirement or dead during the year 2015.

Study area

The study area is Qassim Industrial Area which was established in 1400 AH corresponding to 1980, Industrial area located in the Qassim region, 300 km north of Riyadh city, on the main road link between the city of Buraidah and the province of Onaizah, it contains currently a lot of metal, pharmaceutical and food industries, where the number of factories up to 43 a manufactured product, and the number of working groups with about 3,000 workers from different nationalities and disciplines. There are all kinds of industries in the area, but the most important are the Saudi Pharmaceutical and Medical Appliances factory. Glass factory, Paper Products Factory, and paints factories.[14]

Study population

All workers in different sections of the factories who joined the work in 2011 or during that time and remain at the work at the same institution or retirement or dead during the year 2015.

Inclusion criteria

Workers joined the work in 2011 or during that time and remain at the work at the same institution or retirement or dead during the year, 2015 with complete health records were involved in this study.

Sample selection and distribution

The most common industries in the area were included in this study, representing factories of, Glass, Agricultural products, water pipe factories, Polystyrene products, Means plant for irrigation systems, Paper Factories and Paints factories, then samples from these factories were selected through stratified sampling technique. In each factory, we included "only" workers with complete and updated health records.

Data collection

A questionnaire filled by the well-trained team was designed to collect information needed in the study, in addition to the available health records and medical reports provided by workers or health sectors in the industrial area. The questionnaire consisted of questions about demographical information, year of joining the work, department or section of his work, nature of his duties, and list of non-communicable disease to be checked through the last five years (questionnaire is attached).

Data analysis

The data obtained from the research was analyzed depending on the nature of the variables, descriptive statistics were used to tabulate and describe the data (frequency distribution, percentages), and inferential statistics (Chi-Square tests) was used to examine the association between categorical variables. Using statistical package for social sciences (SPSS).

Ethical considerations

The study was reviewed and approved by the scientific research deputy at University of Qassim -KSA. Then, written permission was obtained from Faculty of Public Health and Health Informatics with an official letter to El-Qassim industrial area before the start of the study.

RESULTS

The descriptive data from the study regarding the socio-demographic characteristic of the respondents (30 respondents), showed that the ages ranged between 20 and above 40 years. The marital status as (married) was dominated. More than (66%) of respondents have more than five years work experiences. Most of the respondents were from South East Asia with a high percentage of Indian citizens (50%), followed by Yamani (16.7%) (Table 4).

Table 4: Distribution of respondents by age group, marital status, work history, and nationality, (N=30).

Characteristics of respondents	No	%
Age group (years)		
20-30	11	36.7
31-40	17	56.7
> 41	2	6.7
Marital status (No.)		
Married	23	76.7
Un married	7	23.3
Work history (years)		
1-3	7	23.3
4-7	20	66.7
>7	3	10.0
Nationality		
Nepal	4	13.3
Yamani	5	16.7
Bangladesh	1	3.3
Sudanese	2	6.7
Indian	15	50.0
Philippine	1	3.3
Pakistani	2	6.7

Regarding types of activities the study revealed that the most common factories in the area were working in the field of class products(20%), agriculture products (8.0%), fiberglass and plastic (water pipes) (8.0%), polystyrene

(8.0%), paper factories (4%) and paint factories (40%). The most dominated were paints factories representing (40%) from the (25) factories (Table 5).

According to the Pre-medical examination records a number of health problems were shown, these medical conditions distributed between Eye infections (16.6%), Respiratory infection, Derma (13.3%), Hearing impairment (13.3%), and (6.7%) diabetes. While no cardiovascular diseases or Speech disabilities recorded. (Table 6).

Table 5: Distribution of respondents by types of industry and nature of work (N=25).

Description of respondents work		
Types of industry	No	%
Glass factories	5	20.0
Agricultural products	2	8.0
water pipe factories	2	8.0
Polystyrene factories	2	8.0
Means plant for irrigation systems	3	12.0
Paper Factories	1	4.0
Paints factories	10	40.0
Total	25	100%

All respondents were free from any type of CVD when they joined the work for the first time in all factories (according to medical records). By the end of the study, results showed one new case in the year 2012 and another one in 2013. The cases increased to be two cases in 2013 and two cases in 2014. Eye diseases increased from (5) cases in initial medical examination to (23) cases over the past five years with high percentage (20.0%) in the year 2014. Also, high percentage observed regarding dermal and respiratory infection (26.7%) & (50%) respectively. Slightly increasing in diabetes and hearing impairment while no speech disabilities were recorded (Table 7).

A marked increase in the overall prevalence rate shown (from the year 2011 to 2015 comparing with the year 2011 when respondents joined their work (Figure 2).

The study showed that the respiratory infections in paints factories were the most common chronic disease among the respondents over the past five years with prevalence (43.8%). Regarding the Derma and Eye diseases, they were common in paints factories and means a plant for irrigation systems, with (11.3% and 9.1%) prevalence rate respectively. Hearing impairment was predominated in paints and agricultural factories. The case of the cardiovascular disease was distributed between points agricultural, paper and polystyrene without any statistical significant.

Table 6: Medical history when the respondents recurred in the work.

Medical history	No.	%
CVD	0	0
Eye	5	16.7
Derma	4	13.3
Respiratory infection	4	13.3
Hearing impairment	4	13.3
Speech disability	0	0
Diabetes	2	6.7
Total	19	63.3

Table 7: Occupational diseases are per say due to the occupation involved.

	Initial		2011		2012		2013		2014		2015		
Medical history	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**Total**
CVD	0	0	0	0	1	3.3	1	3.3	2	6.7	2	6.7	6
Eye	5	16.7	5	16.7	5	16.7	4	13.3	6	20.0	3	10.0	23
Derma	4	13.3	1	3.3	4	13.3	5	16.7	9	30.0	8	26.7	27
Respiratory infection	4	13.3	5	16.7	5	16.7	8	26.7	10	33.3	15	50.0	43
Hearing impairment	4	13.3	1	3.3	2	6.7	2	6.7	2	6.7	4	13.3	11
Speech disability	0	0	0	0	0	0	0	00	0	0	0	0	0
Diabetes	2	6.7	3	10.0	2	6.7	2	6.7	2	6.7	1	3.3	10
Prevalence of above chronic diseases)	19	9.04	15	7.1	19	9.50	22	10.5	31	14.8	33	15.71	120

(Average (%) calculated by (total number cases out of 210).

Table 8: Distribution of chronic cases according to the types of industry.

	CVD		Eye		Dermal		Respiratory infection		Hearing impairment		Speech disability		Diabetes		Total	
Medical history	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No**	**%**	**No**	**%**	**No.**	**%**
Glass	0	0	1	1.0	0	0.0	7	7.22	2	2.06	0	0	0	0.0	10	7.3
Agricultural methods	1	0	4	4.1	0	0.0	0	0.00	0	0.00	0	0	5	5.2	10	7.3
Water pipe	0	0	3	3.1	1	1.0		0.00	1	1.03	0	0	0	0.0	5	3.1
Polystyrene	1	0		0.0	9	8.2	8	8.22	6	6.19	0	0	0	0.0	23	19.6
Means plant for irrigation systems	0	0	11	9.1	0	0.0	4	4.06	0	0.00	0	0	0	0.0	15	13.2
Paper	1	0	1	1.0	6	61.		0.0	0	0.00	0	0	0	0.0	8	7.2
Paints factory	3	3.1	3	3.1	11	11.3	24	24.6	2	2.06	0	0	5	5.2	48	43.5
Prevalence of above chronic diseases)	6	4.12	23	23.2	27	27.7	43	43.8	11	11.3	0	0	10	10.3	120	100.0

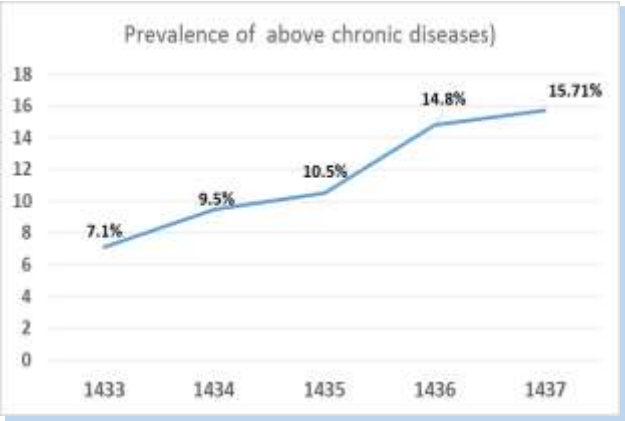

Figure 2: Prevalence of the chronic diseases.

DISCUSSION

Our study showed that the ages of the respondents ranged between 20 and above 40 years. This is consistent with the labor laws issued by the International Labour Organization in 2016 which stipulated that the labor age should not be less than 18 years old taking into account the nature of the work itself.[15] More than (66%) of respondents have more than five years work experiences. Most of the respondents were from South East Asia with a high percentage of Indian citizens (50%), followed by Yamani (16.7%) (Table 4).

Regarding types of activities the study revealed that the most common factories in the area were working in the field of class products(20%), agriculture products (8.0%), fiberglass and plastic (water pipes) (8.0%), polystyrene (8.0%), paper factories (4%) and paint factories (40%). The most dominated were paints factories representing (40%) from the (25) factories (Table 5).

The pre-medical examination records showed a number of health problems among the workers, these medical conditions distributed between eye infections (16.6%), respiratory infection, derma, hearing impairment (13.3%),and (6.7%) Diabetes, in addition to some types of simple infections and minor morbidity cases. While no cardiovascular diseases or Speech disabilities recorded, (Table 6).

By the end of the study, results showed one new case in the year 2012 and another one in 2013. The cases increased to be two in 2013 and two cases in 2014 .The total number of CVD cases during the five years was (6 cases), (Table 7). The only evidence to show that this was a work disease was that the workers did not join any other work or shifted to other jobs.

Eye diseases increased from (5) cases in initial medical examination to (23) cases over the past five years with a high percentage (20.0%) in the year 2014. The Eye disease taken into the account were mainly Visual impairment, refractive error, conjunctivitis, suspected glaucoma , eye infection and cataract ,according to many studies conducted in the field of occupational eye illness showed that these are the most common occupational eye diseases (Table 7).[16,17]

Also, a high percentage observed regarding derma and respiratory infection (26.7%) and (50%) respectively. Comparing with (13.3%) for both derma and respiratory infection in the pre-medical examination (Table 7).

Slightly increasing in diabetes and hearing impairment while no speech disabilities were recorded (Table 7).

The study showed that the respiratory infections in paints factories were the most common chronic disease among the respondents over the past five years with prevalence (43.8%). This result was comparable with the scientific report by European-lung-foundation, stressed that isocyanates, dust, and fumes often found in paints and varnishes and cause some respiratory illness like asthma (Table 8).[18]

Also, our results were consistent with results from a study conducted in Kenya Industrial Research and Development Institute (KIRDI which revealed that proximately (26.6%) of the workers had respiratory diseases, associated with wheezing, shortness of breath, sneezing attacks among other related symptoms. Most of these workers were welders, tanners and, paints manufacturers (Table 8).[19]

Regarding the Derma and Eye diseases, they were common in paints factories and mean a plant for irrigation systems, with prevalence rate (11.3% and 9.1%) respectively. Hearing impairment was predominated in paints and agricultural factories. The cases of the cardiovascular disease were distributed between paint agricultural, paper and polystyrene without any statistical significance (Table 8).

CONCLUSION

A marked increase in the overall prevalence rate of studied non-communicable disease shown from the year 2011 to 2015, comparing with the year 2011 when respondents joined their work, while no changes in the nature of the disease and no new unspecified types of diseases were recorded.

Recommendations

More studies in this field are required.

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Annexure

The questionnaire

Type of industry (……)

1. Nationality (……)
2. Age 20-30 ☐ 31-40 ☐ More than40 ☐
3. Marital status Single ☐ Married ☐ Divorced ☐
4. Joined the work 1-2years ☐ 3-4 years ☐ 5-6 years ☐
5. Nature of the duties .....

Health record for each respondent for the last five years.

	The year	Medical history when joined the work	New diseases
1	2011	☐ Cardic diseases ☐ Eye diseases ☐ Dermal ☐ Respiratory diseases ☐ Hearing diseases ☐ Speech disability ☐ Diabetes	☐ Cardic diseases ☐ Eye diseases ☐ Dermal ☐ Respiratory diseases ☐ Hearing diseases ☐ Speech disability ☐ Diabetes
2	2012		☐ Cardic diseases ☐ Eye diseases ☐ Dermal ☐ Respiratory diseases ☐ Hearing diseases ☐ Speech disability ☐ Diabetes
3	2013		☐ Cardic diseases ☐ Eye diseases ☐ Dermal ☐ Respiratory diseases ☐ Hearing diseases ☐ Speech disability ☐ Diabetes
4	2014		☐ Cardic diseases ☐ Eye diseases ☐ Dermal ☐ Respiratory diseases ☐ Hearing diseases ☐ Speech disability ☐ Diabetes
5	2015		☐ Cardiac diseases ☐ Eye diseases ☐ Dermal ☐ Respiratory diseases ☐ Hearing diseases ☐ Speech disability ☐ Diabetes