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Mortality rates among the employees of Basrah Oil Company, Iraq.

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Abstract— The oil industry is complex in its equipment and design with a lot of chemicals used. This makes workers at risk of accidents like explosions, full from height, fires, chemicals burn, and many other health effects. Many of these health problems remain latent even after retirement. So this study aimed to estimate the mortality rates among the employees of Basrah Oil Company (BOC). A descriptive, record-based study was carried out in November 2020. The records of workers who died during the period from 1st of January 2017 to 31st of December 2018 were collected. The Crude death rate, specific death rate, and standardized mortality ratio were calculated. The results of the present study showed, one hundred thirty-four workers who died during the study period. The age-specific mortality rate increase with advancing age. Furthermore, the male-specific mortality rate was higher than the female-specific mortality. Additionally, the commonest cause of death is external causes followed by cancer. Finally, the standardized mortality ratio (SMR) is less than one. The study concludes that the mortality rate among Basrah Oil Company employees was lower than that in Basrah governorate.

Keywords— Mortality, Rates, Employees, Oil Company, Basrah, Iraq.

1. Introduction

The oil industry is a large supporter of the economy of many nations and states all over the world. Despite that, there's a lot of question about the environmental and human costs of this industry. [1],[2]

A mortality rate by definition is a measure of the frequency of death occurring within a given period in a particular population.[3]Additionally, it has been used for many years as an outcome measure to allow comparisons over time and across populations.[4]

The World Health Organization (WHO) and the International Labor Organization (ILO) estimate that 5–7% of global fatalities are due to work-related illnesses and occupational injuries.[5] Annually there are 2.3 million workers all over the world exposed to a work-related accident, and there are over 6000 occupational mortalities daily.[6]

Basrah Oil Company (BOC) is a national Iraqi company responsible for oil production in the south of Iraq. It is located in Basrah province. The company employs a total of 26509 workers. Furthermore, they are working in nineteen work locations. These locations are either administrative units or oil extraction fields distributed all over Basrah city. Up to a point, this study aimed to determine the mortality rates among the employees of Basra Oil Company.

2.Methodology

This study was descriptive, record-based carried out in November 2020. when the records of workers who died during the period from 1st of January 2017 to 31st of December 2018 were collected. These records were taken from the personnel affairs department in the company. The variables extracted were: age at death year, sex and the direct cause of death is obtained from a copy of the death certificates. The cause of death was classified and coded according to the International Statistical Classification of Diseases and Related

Health Problems, tenth revision, ICD-10.[7]
The data were entered into the Statistical Package for the Social Sciences (SPSS) program version 20 for coding and analysis. Then the mortality rates were calculated according to the following formula:
1.Crude death rate (CDR): number of deaths occur over a specified period / mid-year population *100000.[8]
2.Specific mortality rate:
Age-specific mortality rate: number of deaths occur in a specific age group over a specified period / total number of this age group *100000. [8]
Sex-specific mortality rate: number of death occur in specific gender over a specified period / total number of this sex group *100000. [8]
Cause-specific mortality rate: number of deaths occur due to specific cause over a specified period / mid-year population *100000.[8]
4. Age-standardized death rate (ASDR): age-specific mortality rate *weight in stander population. [8]
The ASDR was calculated by the indirect method of standardization. The age-specific mortality rate of the stander population (Basrah city) was multiplied by the age structure of the company workers, to estimate the expected mortality rate. While the observed mortality is the actual mortality in BOC.Then the SMR was estimated by dividing the observed death over expected death.
The total number of company employees in 2017 were 29107(26254 males and 2853 females). While in 2018 there were 27872 employees (25083 males and 2789 females).
The mortality rates of Basrah city were taken from the annual reports of the Iraqi Ministry of Health and Iraqi Ministry of planning for the years 2017-2018.[9],[10]

3.Results
One hundred thirty-four workers died during the study period. The crude death rate for 2017 and 2018 were (243.93 and 226.03 per 100000 population for the two years respectively). This rate was mildly higher in 2018 than in 2017(table1). Apart from this, the age-specific mortality rate had been increased with advancing age, mostly in those above 50 years. (figure1).
The male specific mortality rate was higher than female specific mortality for both studied years (262.82 and 70.10 per 100000 population for the year 2017, 243.19 and 71.71 per 100000 population for the year 2018) (figure2). Furthermore, the most common cause of death in 2017 is external causes of mortality like accident, assault or events of undetermined intent (V01-Y98) forms 61.84 per 100000 population, followed by malignant neoplasm (C00 - C97) which form 27.48 per 100000 population. While in 2018 the first order is for the unknown cause of mortality (R99) (which mean when the cadaver given to the family depends on judges' decision), followed by malignant neoplasms (C00 - C97) and external causes of mortality (V01-X98) which had the same mortality rate to occupy the second order. (46.64 and 35.88 per 100000 population, respectively). (figure3). Also, the SMR was less than one, which indicates that the observed mortality rate among the Basrah Oil Company employees was less than the expected death. (Table 2)

Table (1) Crude death rates per 100000 population in Basrah Oil Company for the years 2017 and 2018.

Years	Number of deaths	Total population	Crude death rate
2017	71	29107	243.93
2018	63	27872	226.03

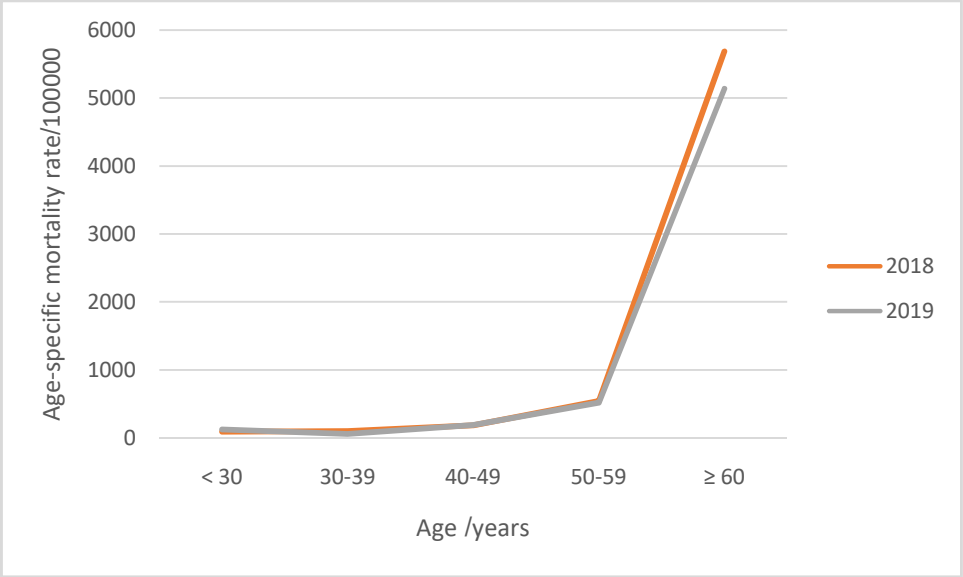

Figure 1: age-specific mortality rate for the employees of BasrahOil Company for the years 2017 and 2018

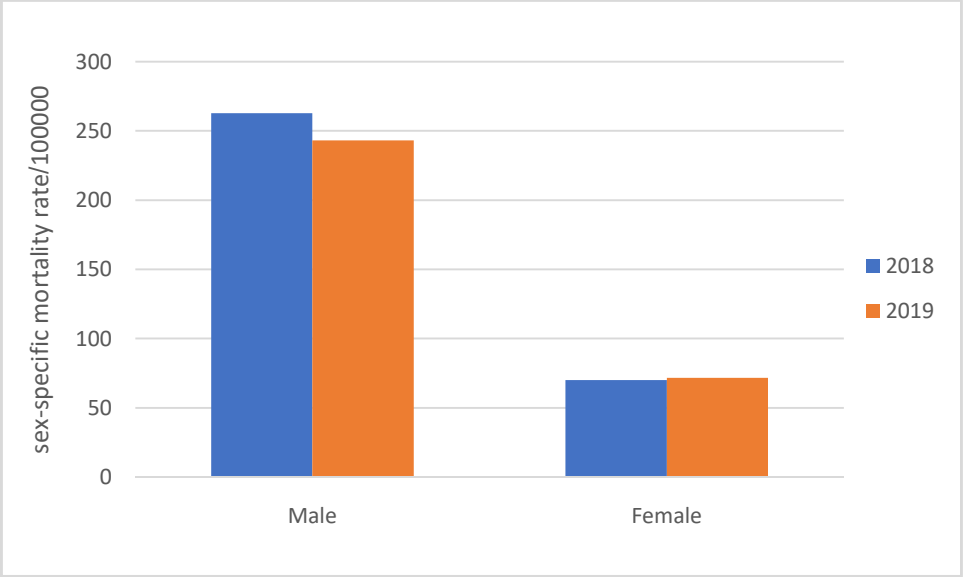

Figure 2: sex-specific mortality rate for the employees of Basrah Oil Company for the years 2017 and 2018

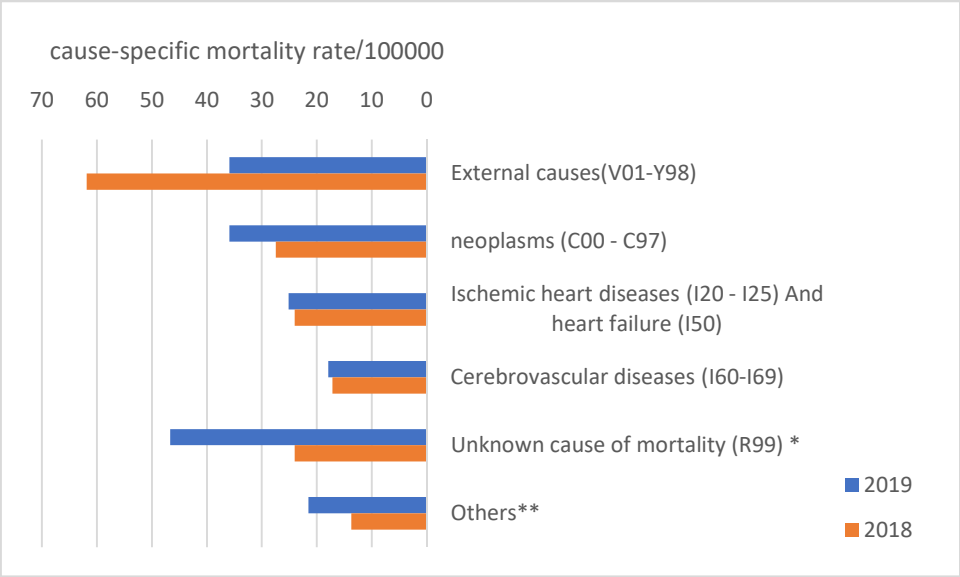

Figure 3: Cause-specific mortality rate for the employees of Basrah Oil Company for the years 2017 and 2018

* Unknown cause of mortality (R99) when the cadaver given to the family depends on judges' decision.
**Others which involve Pneumonia (J12-J18), respiratory tuberculosis (A15-A16), Renal failure (N17 - N19), hepatic failure (K72), inflammatory diseases of the central nervous system (G00 - G09), pulmonary embolism (I26).

Table (2) The expected, observed and standardized mortality ratio among the employees of Basrah Oil Company.

Year of death	Observed mortality	Expected mortality	SMR
2017	71	79.97	0.89
2018	63	79.61	0.79

4.Discussion

The oil industry is complex in its equipment and design with a lot of chemicals used, this makes workers at risk of accidents like explosions, full from height, fires, chemicals burn, and many other health effects. Many of these health problems remain latent even after retirement. [11]

The crude death rate (CDR) for the company workers is lower than that of Basrah which is (420.81, 411.86 for both years). Since there's a significant difference in the age structure between the company and Basrah city, the CDR is not dependable as a comparison tool. The ASDR can be used to solve this problem.[12] Since the age-specific mortality rate among workers was increasing with advancing age, this is a normal finding due to the aging process. Furthermore, male workers had a higher mortality rate than females. This agrees with the fact that males have a higher mortality rate than females all over the world. [13]Additionally the reports of Basrah city for 2017 and 2018 show the same finding with higher male-specific mortality rate than female-specific mortality rate. [9],[10]

Cause-specific mortality rates show remarkable differences from Basrah city because of different age structures, different mortality patterns, and mortality causes, this was resolved by measuring cause-specific standardized mortality ratio. Unfortunately, it's can't be estimated due to the unavailability of data. So, the result is compared to the results of other researches on occupational mortality. In this study the first rank in 2017 for the external causes of mortality followed by malignant neoplasm. In 2018 both malignant neoplasm

and external causes occupy the same rank with equal cause-specific mortality rate. This agrees with the finding of other studies. A cohort studies in Japan and United Kingdom show the same ranking of mortality causes. [14],[15]While in Italian oil refinery workers, Canadian and Australian oil workers cancer is the most common cause of mortality. [16],[17],[18]The estimated SMR was less than one so the morality among BOC workers is lower than expected. Many studies of occupational mortality show similar results.[15],[16] [17],[18]The SMR among Canadian, Italian, and Australian Petroleum workers is less than one. This means a lower mortality rate among oil workers in comparison to the national mortality rate in these countries. The lowest mortality rate among company workers is probably due to many causes. Firstly, is the healthy worker's effect which is a bias in occupational studies occurs mainly due to that healthy individual are likely to be employed. while chronically ill people are usually excluded from work.[19]Secondly, is the better socioeconomic status for the employee, the medical insurance program adopted by the BOC.

Limitation of the study: This study was a record-based study, so it faced all the records problems. Records usually incomplete and incorrect. The quality of the records is out of the researcher's control. Since its retrospective, so there's some doubt that these findings represent the present situation.

5. Conclusion

The study concludes that the mortality in the BasrahOil Company was lower than that in BasrahGovernerte. We recommend to give more attention regarding occupational health researches, starting a health surveillance system for the company to register all workers medical information efficiently.

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