

## Comparison study of Tuberculosis incidence between two Libyan cities: Tarhona and Alkoms during 2007-2017

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### ABSTRACT

**Background:** Tuberculosis (TB) is an infectious disease. Although huge progress has been achieved in reduction of TB-associated mortality, TB infection continues to be a major public health problem in the world. Incidences rates vary according to countries. Incidence rates have not been estimated in recent years in Libya. This study was aimed to estimate and compare incidence rates in two Libyan cities. It also explored which gender is affected more by TB.

**Results:** During the last 10 years, there were 56 and 235 cases of TB in Tarhona and Alkoms, respectively. The number of new cases was generally fluctuated during this period. However, it has gradually increased during the last few years. The overall incidence rates were 0.12 in Alkoms and 0.04 in Tarhona. Males were more affected by TB than females in both cities.

**Conclusion:** Generally, the incidence of TB in both cities was very low and well controlled. The incidence rate is higher in Alkoms city than Tarhona. The exact reason for this difference between the two cities is unclear. Further research is needed to explore the actual reasons behind this difference.

**Key words:** TB, Tuberculosis, infection, Libya, Alkoms, Tarhona, Incidence rate

### Introduction

Tuberculosis (TB) is widely distributed infectious disease, caused by *Mycobacterium tuberculosis*.; Roughly one-quarter of the world's population has been infected (1). Among all infectious diseases, TB is the second most common cause of death, after HIV/AIDS (2). As a global public health challenge in general, geographical disparities are also prominent in the TB burden, with most newly diagnosed cases and deaths occurring in developing countries of Africa and Asia, such as India, Indonesia, Nigeria, Pakistan and China (3). Although huge progress has been achieved in reduction of TB-associated mortality, TB infection continues to be a major public health problem in the world. Previously published studies reported that, in many regions in Africa and Asia, the incidence of TB presented obvious periodic and seasonal features, which indicates that the occurrence of TB might be significantly influenced by atmospherically determinants (4,5). Therefore, understanding the spatial-transient association between atmospherically factors and TB incidence can provide important information for targeting intervention measures of TB.

In Libya, after thorough literature review, we found few studies that were performed to evaluate the incidence of TB in different regions of Libya. In one study, in the Eastern

Libya, the authors reported that the incidence of TB infection is approximately 1-2% in 1959 (6). In another study, in North western Libya which included 1559 cases, about 51% of these cases were pulmonary and rest were extrapulmonary TB cases according to the National Center of Tuberculosis & Chest diseases monitoring in Tripoli city during 2003 (7). Although several studies were performed in different cities of Libya, there were no comprehensive studies in Tarhona and Alkoms cities. Our study will estimate the burden of tuberculosis and frequency in these areas in the last 10 years.

### Methods

This is a retrospective study. Data were collected from two national TB centers in two different Libyan cities (Tarhona and Alkoms), during Jun-2018. Tarhona, is a Libyan town 85 kilometers (40 mi) to the southeast of Tripoli. The population in Tarhona was estimated to be 123,800 in 2000 (8). Alkoms is a city, on the Mediterranean coast of Libya 117 kilometers (72 mi) to the east of Tripoli, with an estimated population was around 189,100 in 2000 (8). All data was arranged, divided according to the sex, and then analyzed.

### Results

Table 1 shows the incidence rate of TB. The total number of TB cases was 56 in Tarhona city (31 males and 25 females), and 235 in Alkoms city (125 males and 110

females), during the last 10 years. In this study, TB in Alkoms and Tarhona was more prevalent among males in both cities.

Table (1): Number and percentage of TB among Tarhona and Alkoms’s populations from 2007 to 2017

Year	Tarhona		Total*	Alkoms		Total*
	Male	Female		Male	Female	
2007	6 (19.3%)	1 (4%)	7 (12.5%)	7 (5.6%)	6 (5.4%)	13 (5.5%)
2008	0 (0%)	1 (4%)	1 (1.7%)	18 (14.4%)	13 (11.8%)	31 (13.1%)
2009	5 (16.1%)	1 (4%)	6 (10.7%)	21 (16.8%)	19 (17.2%)	40 (17%)
2010	0 (0%)	1 (4%)	1 (1.7%)	21 (16.8%)	12 (10.9%)	33 (14%)
2011	2 (6.4%)	5 (20%)	7 (12.5%)	11(8.8%)	10 (9.0%)	21 (8.9%)
2012	4 (12.9%)	6 (24%)	10 (17.8%)	12 (9.6%)	8 (7.3%)	20 (8.5%)
2013	1(3.2%)	1 (4%)	2 (3.6%)	3 (2.4%)	6 (5.4%)	9 (3.8%)
2014	2 (6.4%)	2 (8%)	4 (7.1%)	4 (3.2%)	3 (2.7%)	12 (5.1%)
2015	2 (6.4%)	1 (4%)	3 (5.3%)	7 (5.6%)	7 (6.3%)	14 (5.9%)
2016	4 (12.9%)	1 (4%)	5 (8.9%)	13 (10.4%)	8 (7.3%)	21 (8.9%)
2017	5 (16.1%)	5 (20%)	10 (17.8%)	8 (6.4%)	18 (15.3%)	26 (11%)
<b>Total</b>	<b>31 (55.3%)</b>	<b>25 (44.6%)</b>	<b>56</b>	<b>125(53.1%)</b>	<b>110(46.8%)</b>	<b>235</b>

\*The percentage was calculated by dividing the total number of each year by the total number of the study period for each city

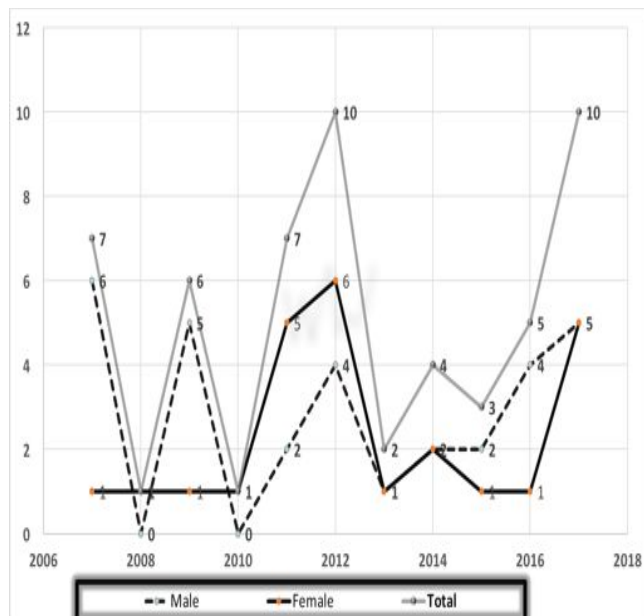


Figure 1: Gender distribution and total number of TB cases among Tarhona population.

The total number of TB cases in Tarhona city was fluctuated during the study period (Figure 1). The most reported cases were in 2012 and 2017; 10 cases each, followed by 2007 and 2011; 7 cases each. The total number of cases dropped sharply to just one case in 2008 and 2010.

In contrast, a higher number of TB cases in Alkoms was in 2009 (approximately 40 cases), then these numbers declined to 9 cases in 2013. In addition, the total number of TB cases was increased during the period between 2013 - 2017 to 26 cases in 2017 (Figure 2). Overall, the incidence rate of TB cases during the last 10 years were 0.12 % in Alkoms city, and 0.04% in Tarhona city. These were calculated based on total population of each city.

As Figure (3) displays, the number of new cases in Alkoms city increased sharply between 2007 to 2009, then started to decline until 2014, then it has been increased until the end of the study period (2017). The pattern of TB cases in Tarhona was up and down almost yearly until 2015 when it started to increase gradually until the end of the study period.

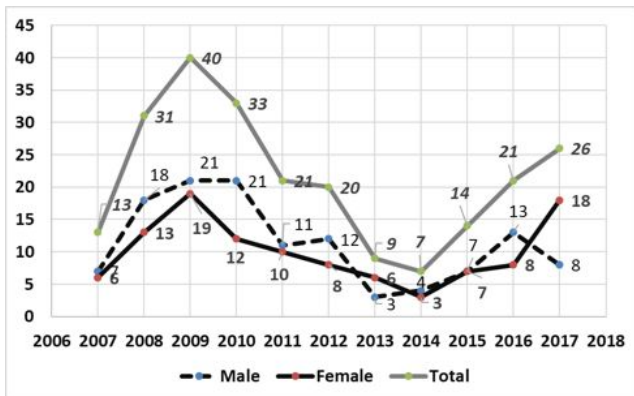


Figure 2: Gender distribution and total number of TB cases among Alkoms population

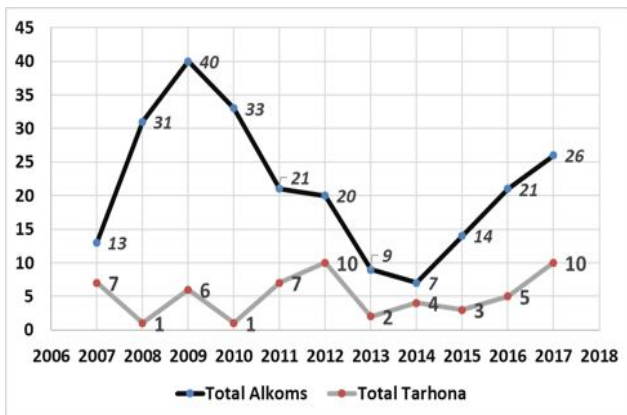


Figure (3) Total number of TB new cases in Alkoms and Tarhona.

**Discussion**

This study was done to identify if there is an increase in new cases of TB in 2 Libyan cities. It was aimed also to identify the most affected gender and if there was a difference in incidence of TB between the both cities. what we found (0.12 in Alkoms and 0.04 in Tarhona). The incidence rate was more in Alkoms than in Tarhona. The reason for this is unclear, however it could be related to the fact that Alkoms is an industrial city while Tarhona is not. In Alkoms there is two cement plants and a power station system. Gases emission such as Sulphur dioxide (SO2) and Nitrogen Oxides (NOx) that result from power

stations have been linked to several disorders of the respiratory system (9). Cement dust particles are also linked to lung malfunction, asthma, respiratory infections (10). Another study (11), stated that cement dust may cause TB. While we cannot assure that is the reason for higher incidence of TB in Alkoms more than Tarhona, but it is potential cause and requires further research. Another possible reason is the climate difference between Alkoms and Tarhona. Alkoms is costal city, it has higher humanity

than Tarhona. Lestari et al (2011) claimed that living in humid areas is likely to increase transmission of TB (12).

Results of this study is in consist with other studies regarding gender of patients (6,7). The number of new cases is more within males than females. This is may be because the males usually work and interact more with other people than females. This would increase the risk of exposure to the disease from affected individuals.

The overall incidence rate was higher in the current study than a previous study (7). The authors of that study reported incidence of TB was 0.033, which is less than

The study has several limitations. Firstly, essential data such as age could not be obtained. Thus, which age group is more affected by TB is not known. However, as previous studies have confirmed, TB affects ages around the 20-55 years. Secondly, a recent estimation of population is not available. Our analysis of data was based on estimation of population that has not been obtained from an official or governmental body. However, our study has several strength factors. It is the first in Tarhona and Alkoms cities. It also shows, although both cities are not far away for each other, there is high difference between incidence of TB in both cities. This may be guide future research about the actual reasons behind this difference between the two cities.

**Conclusions**

There is increase in incidence of TB in the last few years. The incidence of TB among Alkoms population is more than Tarhona population. Higher humidity and the industrial nature of Alkoms may be responsible for this high incidence rate. Although, the numbers are not too high they should warn authorities to find solution.

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