ACTA SCIENTIFIC MEDICAL SCIENCES

Volume 3 Issue 4 April 2019

Research Article

Tuberculosis Surveillance Data Analysis, Volta Region, Ghana

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Received: February 22, 2019; **Published:** March 01, 2019

Abstract

Introduction: Tuberculosis (TB) is a major global health problem. It causes ill-health among millions of people each year and ranks alongside the human immunodeficiency virus (HIV) as a leading cause of death worldwide. In 2014, there were an estimated 9.6 million new TB cases: 5.4 million among men, 3.2 million among women and 1.0 million among children. The study's objective was to determine the case detection rate and distribution of TB cases in the Volta region over the five (5) year period by person, time and place.

Methods: A retrospective descriptive study was conducted where we reviewed the case detection rates for all forms of TB cases notified by all the districts in the Volta region during 2010 - 2014.

Results: Over the 5-year period from 2010 to 2014, 7873 patients with all forms of TB were notified by the Volta region. Out of these total cases, 2835 were sputum positive TB cases. Of this, 1,758 (62%) were males and 1077 (38%) were females. The annual number of all TB cases showed a rising trend from 130 cases in the year 2010 to 1763 in 2013; but declined to 1608 in 2014. Close to 45% of all forms of TB cases are notified by three districts which are Ketu South Municipal, Ho Municipal and Keta Municipal.

Conclusion: The study therefore concludes that the average cases detection rate for all forms of TB which is 73 cases per 100000 populations is lower than that of Ghana which is 171 per 100000 populations. Tuberculosis affects more men than women in the Volta region and most of the cases are notified by three municipals namely Ketu South, Ho and Keta Municipals.

Keywords: Tuberculosis; HIV; Case Detection Rate; Volta Region; Ghana

Introduction

Tuberculosis (TB) is a bacterial disease that is caused mycobacterium tuberculosis complex, commonly called the tubercle bacilli. Many aetiological mediators of TB have discrete hosts, zoonotic budding and reservoirs [8] (Barrera, 2007).

Tuberculosis is spread via the air as droplets (aerosols) when an active TB patient coughs or sneezes [1,2]. Extra pulmonary TB commonly occurs in immune-compromised persons and young children [3]. If not treated properly, TB disease can be fatal. People infected with TB bacteria who are not sick may still need treatment to prevent TB disease from developing in the future.

The symptoms of active TB infections are chronic cough with blood stained sputum, fever, night sweats and weight loss [4]. Tuberculosis followed HIV as the greatest killer globally [1,2].

Tuberculosis (TB) remains one of the world's deadliest communicable diseases. In 2013, an estimated 9.0 million people developed TB and 1.5 million died from the disease, 360 000 of whom were HIV-positive. TB is slowly declining each year and it is estimated that 37 million lives were saved between 2000 and 2013 through effective diagnosis and treatment. However, given that most deaths from TB are preventable, the death toll from the disease is still unacceptably high and efforts to combat it must be accelerated if 2015 global targets, set within the context of the Millennium Development Goals (MDGs), are to be met.

Of the estimated 9 million people who developed TB in 2013 globally, more than half (56%) were in the South-East Asia and Western Pacific Regions. A further one quarter was in the African Region, which also had the highest rates of cases and deaths rela-

tive to population. India and China alone accounted for 24% and 11% of total cases, respectively [1].

About 60% of TB cases and deaths occur among men, but the burden of disease among women is also high. In 2013, an estimated 510 000 women died as a result of TB, more than one third of whom were HIV-positive [1,3].

There were 80,000 deaths from TB among HIV-negative children in the same year. An estimated 1.1 million (13%) of the 9 million people who developed TB in 2013 were HIV-positive. The number of people dying from HIV-associated TB has been falling for almost a decade. The African Region accounts for about four out of every five HIV-positive TB cases and TB deaths among people who were HIV positive. A tuberculosis (TB) prevalence survey conducted in 2014 has revealed that TB burden in Ghana is three times higher than the World Health Organization (WHO) estimates [4].

Prior to the survey, WHO estimates showed that TB cases in Ghana were below 92 per every 100,000 people but the survey across the country showed that there were 286 cases per every 100,000 population in Ghana [3].

In Ghana, TB mortality rate is considered high at 7.5 per every 1,000 infected and the prevalence is 264 per 100,000 in general population [5].

As an arm of the Ghana National TB Control Programme (NTP) implementation, the Volta region also adopted the strategies of the NTP and further added a few innovations which led to the opening of additional sites for sputum examination, and treatment in the Volta region.The Volta region detected 1608 (71%) of all forms of TB in 2014 as compared to the total estimate of 2268 for the same year. Out of the cases detected, 46.9% of the cases were sputum smear positive cases. The region recorded 69.4% treatment success rate with 9.5% death rate according to the 2014 annual report of the Volta region [3].

Rationale/justification for the study

Millennium Development Goal 6 proposed to halve and reverse the incidence of HIV, malaria and TB and other diseases by 2015 (WHO, 2012a). Since 2000, a number of interventions have been initiated to deal with further TB infection. As per the strategy to control TB to the lowest level, the WHO launched the stop TB strategy. One thematic of this strategy is to promote research with the objective of identifying localized factors. This study in part shall contribute to the knowledge of localized factors.

A number of interventions/strategies have been employed to control TB in Volta Region. This study was intended to provide policy makers with clues about strategies that have worked or have not worked over the years.

General objectives

- To determine the case detection rate and distribution of TB cases in the Volta Region over the 5 year period by person, time and place.

Specific objectives

- To establish the case detection rate for the region.
- To estimate the prevalence of TB cases in the region.
- To show the trend of confirmed sputum smear positive cases in the region by person, time and place.

Methods

Study design

Retrospective descriptive study was employed to review all forms of TB cases to ascertain TB case detection rates.

Study setting

Volta region is one of the 10 regions of Ghana located in the eastern geopolitical zone with an estimated population of over of 2,338,154 according to the 2010 Population and housing census. The region has 25 districts with 21 Public Hospitals, 8 Private Hospitals, 153 Health centres and 265 CHPS compounds. All districts have standard unit registers from the NTP and report to the regional level quarterly. Each district has a Tuberculosis control coordinator responsible for managing and coordinating TB control activities as well as keeping up-to-date and accurate record of activities there. The region also has a regional Tuberculosis control coordinator whose responsibilities among others include collection, collation and analysis of data on TB activities in the region and reporting to the NTP.

Data collection

For the purpose of this work, we undertook a retrospective review of the case detection rate for all forms of TB cases notified by all the districts in the region during 2010 - 2014. The districts quarterly reports submitted to the region of all TB cases notified during the period were reviewed using data recorded in the TB07 (case registration form). All forms of TB were individually reviewed and information on sex, age, district, laboratory reports of sputa (smear positive or negative), Tb treatment status and outcome. These information were verified from DMIS.

Data analysis

The review, collected data were recorded and analyzed using Microsoft Excel software. Results were presented in graphs and tables.

Ethical clearance

Prior to the study/data collection, ethical clearance was sought from the Volta Regional Health Directorate. The department of Epidemiology and Disease Control, School of Public health, University of Ghana, wrote an official letter to Volta Regional Health Directorate for permission to conduct the study in the region. The Regional Health Director, after endorsing, wrote to the Regional Health TB control programme for permission.

Data quality

Data quality issues were observed from both the hard copies of the forms and electronic system. There were some minor issues with the data such as missing variables on age/date of birth, sex and district, because secondary data were used. These issues were addressed in the cause of the exercise.

Results

Over the 5-year period from 2010 to 2014, 7873 patients with all forms of TB were notified by the region. Out of this total case, 2835 were sputum positive TB cases. Of this, 1,758 (62%) were males and 1077 (38%) were females.

The trend in CDR for all TB cases notified in the Volta region is shown in Figure 2. Case detection rate for all TB rose from 68% in 2010 to 80% in 2013 and then declined to 71% in 2014.

It was established that most of the all forms of the TB cases notified were from Ketu South 1800 (23%) cases, Ho Municipal 942 (12%) cases and Keta Municipal 741 (9.4%) cases.

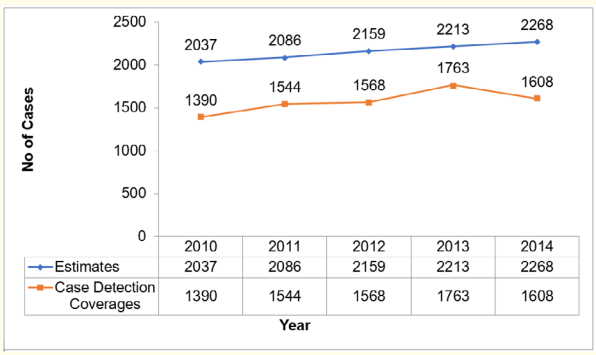

Figure 1: Estimates and case detection rates for 2010-2014, Volta Region, Ghana.

It is illustrated from the figure above that from 2010 to 2014m TB estimates at Volta Region was steadily increasing and case detection rate was also on increase. However, 2013 had the higher case detection rate followed by 2011 then 2012. This increase could be as a result of community sensitization on TB screening, and also it could be because in these years (2013 and 2011), there were more trained and competent laboratory bench staff.

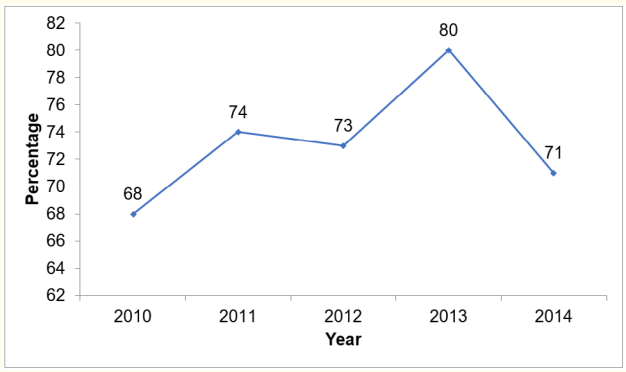

Figure 2: Case detection rate, Volta Region, Ghana. 2010-2014.

This graph depicts case detection rates in percentage. The number of cases detected were more in 2013. From 2010, it can be observed that case detection rate fluctuates, increases in one year and decline in the other year. This could be due to staff commitment at all levels in sensitizing the community for early report of signs and symptoms of TB. It could also be explained that the increases could be due to a few months in the year, a month that the deputy regional TB and HIV coordinator is available in the region. During this exercise, the deputy coordinator was schooling and there were times that he will be away in Accra for lectures.

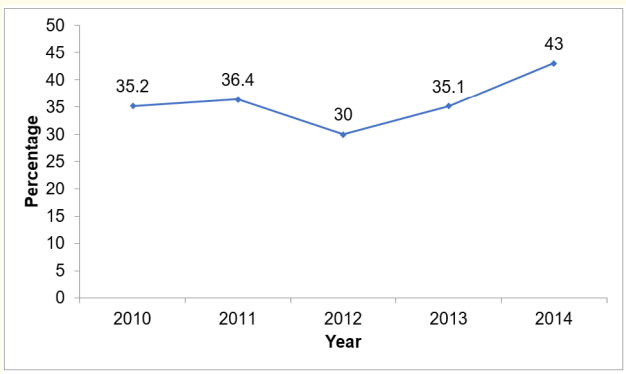

Figure 3: Percentage sputum positive cases for 2010-2014, Volta Region, Ghana.

The graph illustrates percentage sputum smear positives for the period under study. It is observed that positivity have been on increase except in 2013 when there was a sharp decline. The sharp decline could be due the reason that cases did not come for screening/diagnosis. It could also be that there were minimal cases compared to the other years. Also, it be due to the laboratory personnel competency. There might be a new laboratory personnel during this period.

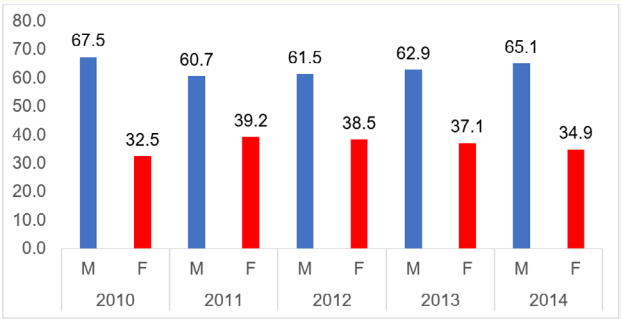

Figure 4: Percentage of sputum positive TB by sex, VR-Ghana, 2010-2014.

The graph depicts percentage sputum Tb by sex. It is observed that throughout the period under study, more males are affected every year. This could be because men are more involved in activities that prone them to Tb infection more than women. It is also known that some predisposing factors to Tb such as smoking, more men smoke than females.

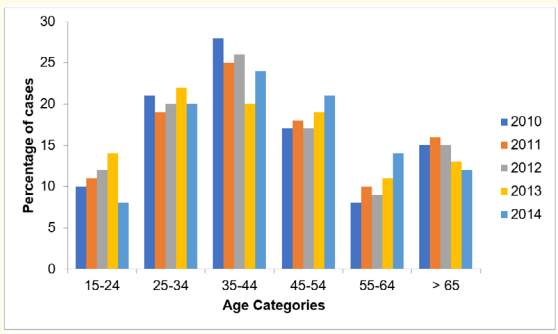

Figure 5: Sputum smear positive cases by age group, VR-Ghana. 2010-2014.

This graph indicates sputum smear positivity by age group in Volta region-Ghana, from 2010 -2014. From the graph, the age group 35-44 years are more affected followed by 25-34 years group. This is in line with the global trend of Tb in age groups, where more adolescents are affected with Tb. This is predominantly due to their daily activities. In Volta region, these are age groups more engaged in productivity activities such as farming. Usually, these groups, 25-34. 35-44, and 45-54 years are more productive and are involved in a lot of activities that may prone them to Tb.

No	District	2010	2011	2012	2013	2014
1	Adaklu	24	17	4	0	8
2	Afadjato	0	0	0	11	18
3	Agotime-Ziope	0	0	0	8	3
4	Akatsi North	0	0	0	0	1
5	Akatsi South	94	102	55	35	49
6	Biakoye	22	20	32	53	44
7	Central Tongu	0	0	0	22	30
8	Ho Municipal	196	174	195	208	169
9	Ho West	0	0	0	28	15
10	Hohoe	120	118	126	99	92
11	Jasikan	45	47	51	40	37
12	Kadjebi	20	33	51	91	78
13	Keta	129	163	120	162	167
14	Ketu North	60	84	91	89	98
15	Ketu South	315	397	395	401	292
16	Kpando	73	67	90	67	81
17	Krachi East	7	11	12	21	47
18	Krachi Nchumuru	0	0	0	22	42
19	Krachi West	33	31	37	30	31
20	Nkwanta North	32	29	32	60	41
21	Nkwanta South	60	60	52	47	83
22	North Dayi	0	0	0	52	31
23	North Tongu	89	124	151	133	76
24	South Dayi	23	27	25	36	41
25	South Tongu	48	40	49	48	34
Total Cases		1390	1544	1568	1763	1608
Total Population		2099 876	2150 273	2225 489	2281 126	2338 154
# of cases per 100,000 pop		68	74	73	80	71

Table 1: Trend of TB cases by reported by districts for 2010-2014.

The table illustrates the trend of Tb cases reported by district for 2010-2014. The number of cases per 100,000 population was in high in 2013 followed by 2011. This could be as a result of low turnout in some other years, problem with community sensitization and/or minimal cases in the communities.

Discussion

The result of this study shows that on average, the incidence case per year for the region is 73 per 100 000. This value is below the national incidence estimate of 264 per 100 000 (2012). It is also below the Sub-Saharan Africa, which is 255 cases per 100 000, and global, 122 cases by 100 000 [1,3].

Out of the total cases of sputum smear positive, males constitute the higher number than females, 64% and 36% respectively. These figures agree with WHO global report on TB cases by sex. Higher percentage of cases is adolescents and adults, which is in line with WHO picture of TB in developing countries. According to WHO, TB mostly affects adults in their reproductive ages, although all ages are at risk of the disease [1].

The findings of this study with respect to sex and age patterns of all forms of TB are consistent with the documented global epidemiology of the disease (WHO. Global tuberculosis control: Epidemiology, strategy, financing: WHO report 2009 [1]. Also, the observed modal age group for the sputum smear positive cases of 35-44 years is consistent with the report and the belief that TB is a disease of adults and that the burden of the disease lies more with the male sex [2].

Furthermore, the number of all TB cases reported annually in the Volta region showed a rising trend and the same for sputum smear positive TB cases. Though, these trends are good, it should, however, stimulate further research especially as regards the quality of the microscopic centres within the diagnostic services of the districts in the region. In contrast to this study finding, a report from Northwest Turkey where both active and passive TB case finding were practiced, showed that TB case notification decreased over the period reviewed; Kart L., *et al*. [3] it is most likely that the active case detection strategy might have been responsible for the observed TB case detection rate decline.

With the average of 36.5 case detection rates for sputum smear positive cases notified, it indicates that over 50% of the cases notified are sputum negative. This can be due to diagnostic errors or the presence of HIV among TB patients which make it difficult to diagnose TB with sputum microscopy [5].

Ketu South, Ho and Keta municipalities constitute the large number of cases. This could be because these municipalities are part of the most urbanized areas of the region. Also, they are densely populated and the availability of specialized health facilities in these municipalities contributes to the high case incidence. Specifically at Ho Municipal, three districts (Agotime-Ziope, Ho West and Adaklu) which it shares boundaries with have no hospitals and Adaklu do not even have a diagnostic centre in any of its health facilities.

In 2013, out of the 1763 of all TB cases notified, 69.4% were treated whilst 9.5 were declared dead after the end of the treatment period. This means that 390 (22%) of the cases relapsed, defaulted or failed treatment. Considering this and the total number of all forms of TB detected in 2014 (1608), with the estimated population for 2014 as 2338154, then the prevalence for all forms of TB during 2014 is 0.09 or 85 cases per 100000 populations. This is lower than the national prevalence of 282 per 100000 populations for the same year as reported by the World Health Organization [1].

The study has limitations because secondary data from the Region's TB programme was used for the study; therefore, minimal errors could have occurred during data entry and computations but would not have affected the study's results. Most importantly, the disease trends identified in the study only represent cases managed in Health facilities, which cannot be the true situation in a population where alternate treatment options exist. The assumption is in line with United Nation's opinion that the TB data reported by ministries in developing countries were usually only a fraction of the real population figures [1].

Conclusion

In conclusion, there is an average case detection rate of 73 cases of all forms of TB per 100000 population with a male to female ratio of about 2:1 cases. More cases are found in adults and the adolescents, and there are almost more than half of cases that are sputum smear negative.

The TB cases are concentrated in three Municipalities namely Ketu South, Ho and Keta. The prevalence for all forms of TB for 2014 is 0.09 or 85 cases per 100000 populations which is lower than the national prevalence.

Recommendations

Although, the National TB control program is on sensitization, the district TB Coordinators should intensify TB education in their respective districts.

The disease surveillance officers in the region should maintain training personnel in the districts to ensure proper, accurate and complete reporting. There should be a constant monitoring of the laboratory technicians on TB diagnosis.

Stakeholders including government and other development Partners should support the fight with money and technical support and urged government to exhibit serious political commitment in the fight against TB.

Public heath actions taken

- The study findings were disseminated to the regional directorate for any possible action to be taken.
- The director of public health of the region was urged to involve all the key stakeholders in sensitization.
- The deputy director of Health Information in the region was also tasked to regularly conduct refresher training on data entering and cleaning.
- The deputy regional TB and HIV coordinator was also tasked to strengthen surveillance on TB and HIV in the communities through the disease control offers.

Acknowledgement

It is a pleasure and a privilege to thank all, but most particularly the Deputy Regional Director of Public Health (Volta Region) and the entire staff of the Public Health Unit, Volta Region.

My special thanks go to Mr. Livingstone Asem, the Deputy Health Information Officer Volta region, Mr. Eric Quaye Appiah, the Deputy Regional TB and HIV Coordinator and Mr. Gideon Kye-Duodu, my mentor.

It is equally a joy and an honour to thank the entire staff of GFELTP and the School of Public Health, University of Ghana.

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