Original Article

Progress towards eliminating tuberculosis in Ga West Municipality, Ghana: analysis of tuberculosis surveillance data, 2017

Emmanuel K. Tender[1], Stephen Atasige[2], Delia A. Bandoh[1], Donne K. Ameme[1], Edwin A. Afari[1], Priscillia Nortey[1] and Ernest Kenu[1]

Ghana Med J 2020; 54(2) supplement: 26-31 DOI: http://dx.doi.org/10.4314/gmj.v54i2s.5

[1]Ghana Field Epidemiology and Laboratory Training Program, School of Public Health, University of Ghana, Accra
[2]Salaga Health Directorate, Ghana Health Service, Salaga, Ghana

Corresponding author: Priscillia Nortey **E-mail:** panortey@gmail.com
Conflict of interest: None declared

SUMMARY

Objective: To assess the progress made towards the actualization of the 80% reduction in incident cases, monitor trends and to assess the quality of GWM TB surveillance data from 2012 to 2016.
Design: The study was descriptive secondary data analysis
Data Source: Tuberculosis cases recorded in the District Health Information Management Systems (DHIMS) and municipal TB registers. The Municipal TB Coordinator was interviewed for clarification on the data. A TB patient was defined as one who coughed persistently for two weeks or more.
Main outcome measure: Trend of TB cases in Ga West Municipality
Results: A total of 441 TB cases were registered of which 68.9% were smear positive. Males were (67%). Age group 35-44 years were the most affected (28.6%). The incidence rose from 21.5 (2012) to 41.6 (2015). The 2016 incidence was 40.7 ($\pm$ 5.63) per 100,000 population. This is significantly different from the current national incidence of 156 ($p < 0.05$). Data was 95% complete. Discrepancies existed between data in registers compared to the DHIMS but were not statistically significant.
Conclusion: The 80% reduction in incident cases target may not be attained by the GWM due to the rising number of incident cases. However, data quality is good.

Keywords: Tuberculosis, data analysis, DHIMS 2, tuberculosis, incident cases
Funding: The study was funded by the authors

INTRODUCTION

Tuberculosis (TB) remains one of the top ten causes of death around the world.[1] Mortality due to tuberculosis in 2016 was 1.3 million whiles morbidity was estimated to be 10.4 million cases.[2] TB kills more people than HIV and malaria globally though the disease is both preventable and curable.[3]

After Asia (61%), the second highest contributor to the 2015 worldwide cases was Africa, which accounted for 26%.[1] Based on mortality and morbidity statistics, the World Health Organization (WHO) has classified countries into various categories such as high burden, high incident and low incident levels. Ghana falls into the category of high incident countries[3] and recorded about 156 cases per 100,000 population in 2016. [1]

TB surveillance activities in Ghana is supervised by the National Tuberculosis Control Programme (NTP). The NTP executes this function in a five-tier system namely at the national, regional, district (municipalities), sub-districts and community levels.[5] As at 2017, the TB surveillance system in the country recorded a case detection rate of 33% with male to female ratio of diagnosed cases standing at 2:1.[5]

As a member of the WHO, Ghana has adopted the 2014 End TB Strategy project. The strategy was developed to speed up efforts by countries towards ending the TB epidemic by the year 2030.[6] One of the key indicators of the End TB strategy is the targeted 80% reduction in incident cases by 2030 at the global level. The Health sector in Ghana is subdivided into municipalities for easy administration.

We analyzed the Ga West Municipality (GWM) TB Surveillance data to assess the progress being made towards the realization of the 80% reduction in incident cases, monitor trends and to assess the quality of the data from 2012 to 2016.

METHODS

Study area

GWM is one of the sixteen (16) Districts in the Greater Accra Region of Ghana. There are seven sub-municipalities that make up the municipality. The municipality shares boundaries with the following: Akwapim South District to the north, Accra metropolis to the south, to the east by Ga East municipality and to the west by Ga South Municipality.

The municipality is made up of 150 communities with about 60% being rural and 40% peri-urban and urban. Currently, there are 32 health facilities in the municipality, made up 14 public and 18 private clinics. Each of the public health facility has a TB coordinator who reports on TB cases to the municipality. Private facilities neither have TB coordinators nor report cases to the municipality. The population under surveillance based on projected figures is 250, 915 (GWM, 2014).

Study design

A descriptive secondary data analysis of DHIMS and municipal TB register, over the period of 2012 to 2016.

Data collection

Data on demographics, type of TB, treatment outcome and HIV status of all 441 registered TB cases within the period under consideration was extracted for analysis. The municipal director of health services and the municipal TB coordinator were both interviewed to provide insight into how the data were collected and collated from the health facility level to the municipal level before being entered into DHIMS.

Variables

The main dependent variable of the study was the number of TB cases and the independent variables included: sex, age groups, type of TB, sub-municipality, HIV status, treatment outcome. The above variables and other relevant information were extracted from the TB register. Electronic forms of the TB register were used with the manual register to make up for some of the missing data. Data was validated using those captured in the DHIMS.

Case definitions

Suspected case

A case was defined as a person who coughed continuously for more than two weeks.

Confirmed case

Confirmed case of TB was defined as follows:

For smear-positive pulmonary TB

(a) a suspected patient with at least 2 sputum specimens positive for acid-fast bacilli (AFB), or

(b) one sputum specimen positive for AFB by microscopy and radiographic abnormalities consistent with active PTB as determined by the treating medical officer, or

(c) one positive sputum smear by microscopy and one sputum specimen positive on culture for AFB.

For smear negative pulmonary TB:

A patient who fulfils all the following criteria:

(a) two sets taken at least 2 weeks apart of at least two sputum specimens negative for AFB on microscopy, radiographic abnormalities consistent with PTB and a lack of clinical response despite one week of a broad spectrum antibiotic, a decision by a physician to treat with a full course of anti-TB chemotherapy, or

(b) a patient who fulfils all the following criteria: severely ill, at least two sputum specimens negative for AFB by microscopy, radiographic abnormalities consistent with extensive pulmonary TB (interstitial and miliary), a decision by a physician to treat with a full course of anti-TB chemotherapy, or

(c) a patient whose initial sputum smears were negative, who had sputum sent for culture initially, and whose subsequent sputum culture result is positive.[7]

Organization and analysis of data

Frequencies and proportions were generated for variables such as age groups, sex and sub-districts using Microsoft Excel Office 2013. Incidence was calculated as the number of new cases against the population of the municipality expressed per 100,000 populations. Line graphs were constructed to show trends over the period based on selected variables. Proportion of missing data was used to estimate the quality of the data. Discrepancies noticed between data captured in the TB register and those in the DHIMS were subjected to student t-test using STATA version 14 at 95% confidence interval to determine if there was any significant difference.

Ethical clearance and approval

In order to carry out the studies, clearance and approval for the studies was obtained from the Regional and Municipal Health Directorates. All identifiers were removed from data. Data extracted was kept on password-protected computers.

RESULTS

A total of 441 TB cases were registered in the municipality from 2012 to 2016. The mean age was 39.74 (± 15.68) years. The number of males (296/441 (67.12%) that contracted TB over the period were twice the number of females (Table 1). About one-third (30.2%) of the registered cases were from Amasaman, the municipal capital (Table 1).

Table 1 Demographic characteristics of all registered TB cases, GWM, 2012 – 2016

Variable	Frequency (%)
Sex	
Female	145 (32.88)
Male	296 (67.12)
Sub-Municipal	
Amasaman	133 (30.20)
Kotoku	33 (7.50)
Mayera	27 (6.10)
Oduman	63 (14.3)
Ofankor	47 (10.70)
Pokuase	92 (20.90)
Trobu	8 (1.80)
Others	35 (7.90)
Unknown	3 (0.70)

*Others = TB cases that originated outside the GWM namely Ga East, Ga South, Ga Central and Eastern region of Ghana.

*Unknown = TB cases whose places of residence were not documented.

The figure 1 below shows that the reported incidence of the disease in the municipality increased sharply from 21.5 in 2012 to 29.8 per 100,000 population in 2013. The highest incidence of 41.6 per 100,000 population was recorded in 2015. A similar phenomenon though with a steeper rise was observed from 2014 to 2015 before showing a slight decline to 40.7 per 100,000 population.

Figure 2 reveals that both age groups 0 – 14 years and 15 – 24 years had more females contracting TB than males, that is, 54% and 57% respectively. The trend reverses for those aged from 25 years and above. From ages 35 to 65+ years, the proportion of males that fell sick with TB were more than twice their female counterparts. Differences between age and sex of TB cases was significant ($p < 0.001$). Of the 441 cases, the age group most affected were those aged 35 – 44 years with 28.6% (128/441) whiles the least affected was 0 -14 years with 2.9% (13/441).

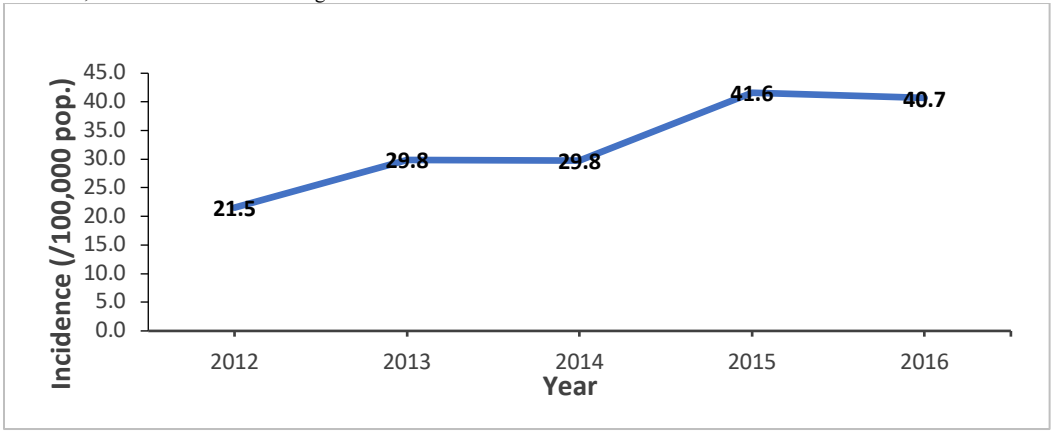

Figure 1 Reported incidence of all TB cases in GWM, 2012 – 2016

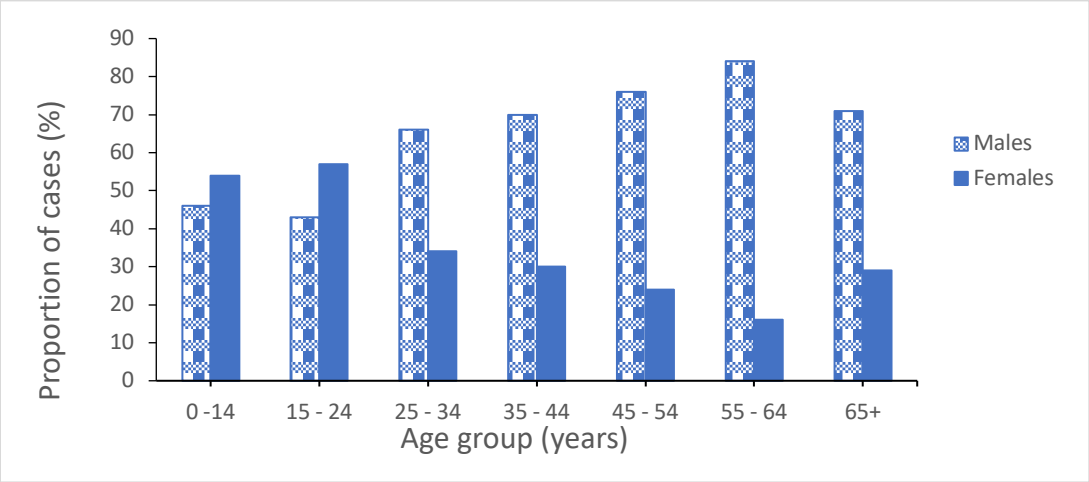

Figure 2 Age distribution of cases by sex in GWM, 2012 - 2016

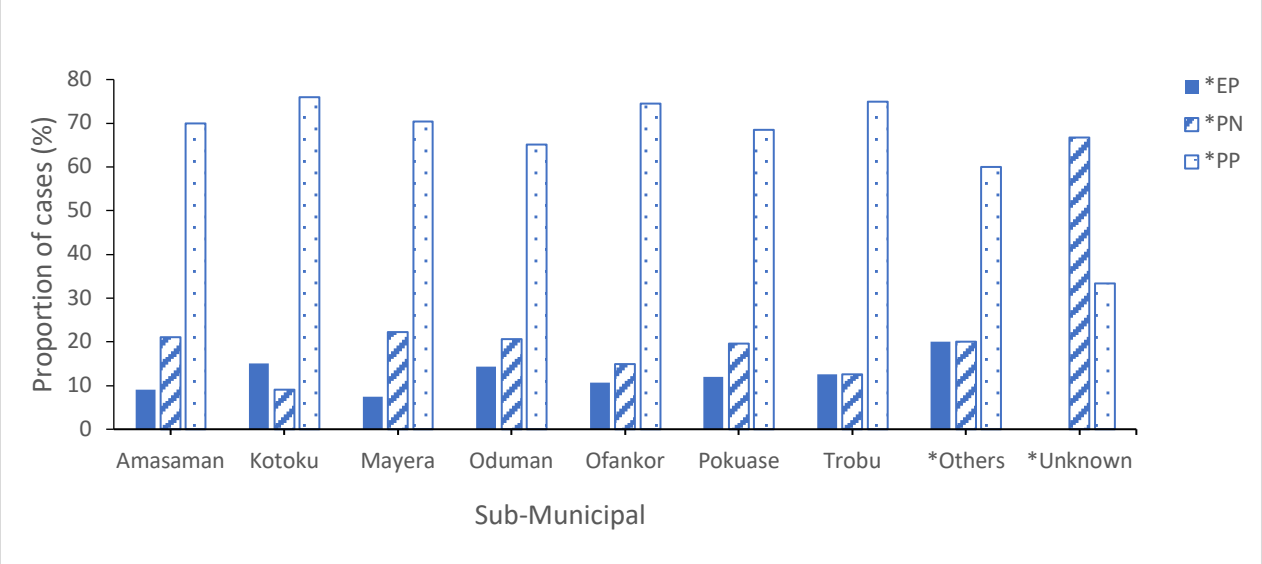

Figure 3 Distribution of All TB cases by Sub-municipals, GWM, 2012 -2016

**EP – Extra Pulmonary TB, *PN – Smear negative TB, *PP – Smear positive TB *Others – Ga East, Ga central, Ga South and Eastern region *Unknown – Cases from residences that were not documented*

The proportions of smear positive TB cases (PP) cases were more prominent in all seven sub-municipals. The highest PP cases (76%) was recorded in the Kotoku sub-municipal whiles the lowest was 33.3% registered in the Unknown category. Smear negative TB cases (PN) recorded its highest proportion (66.6%) in the Unknown category. Extra pulmonary TB cases were in the lowest proportions with the lowest (7.4%) occurring in the Mayera sub-municipal.

The average data completeness over the period under consideration was 94.83% ($\pm$ 2.79). Data was most complete in 2014 (97.40%) whiles the year in which data was least complete was 2013 (91.71%). One sample t-test results revealed that there was no significant difference between the mean expected data compared to the observed data over the period 2012 to 2016 ($p > 0.05$). Furthermore, the average of all TB cases recorded in the DHIMS (2012 – 2016) was not statistically different from those registered in the TB manual register ($p > 0.05$).

Table 2 Data completeness of GWM TB data, 2012 – 2016

Year	Expected	Observed	% Data Completeness	All TB cases from DHIMS	All TB cases from Manual Register
2012	1065	1027	96.43	75	71
2013	1170	1073	91.71	62	78
2014	1155	1125	97.40	71	77
2015	1635	1581	96.70	88	109
2016	1590	1461	91.89	100	106
Total [Confidence Interval]	6615 [4952.52 – 8277.48]	6267 [4712.73 – 7821.27]		396 [303.35 – 488.65]	441 [330.17 – 551.83]
Mean (Standard deviation)	1323 (±119.76)	1253.4 (±111.96)	94.83 (±2.79)	79.2 (±14.92)	88.2 (±17.85)

DISCUSSION

The main objective of the study was to assess the progress of the GWM towards the realization of the 80% target reduction in incidence cases of TB. The analysis revealed that the incidence rate of TB reached record high (41.6 cases per 100,000 population) in 2015, an increase of about twice the rate that pertained in 2012 in the GWM. Should this trend be allowed to continue, it would mean that the 80% reduction target in incident cases by the year 2030 by the End TB Strategy may not be attained by the GWM. Moreover, there was a slight rise in the notification rate of the disease between 2012 and 2013 at the national level.[8]

This is an indication that the number of cases may be rising at the national level as well. Africa as a whole continue to witness an upward trend in TB cases especially in Sub-Saharan African (SSA) countries though there is a significant 22% decline globally as reflected in most European countries.[6] According to Amenuvegbe, Anto and Binka (2016), there are municipalities in Ghana whose TB case detection rates are below the national average of 81%.[9] This lends support to the fact that many potential cases go undetected in the communities only to develop into chronic illnesses with the potential of further spreading the disease. This could increase significantly the burden of the disease in those municipalities. Another key challenge identified by the WHO country office (Ghana) in their 2016 annual report is the need to strengthen the capacity of health professionals at the community level to handle TB cases efficiently. [10]

Other notable risk factors of TB that could have contributed to the upsurge in new infections in the GWM were overcrowding, poverty, Human Immunodeficiency Virus (HIV) infection, malnutrition, drug and alcohol abuse.[11] This is attested to by a report by Millet et al., 2013. Moreover, some of these factors have been demonstrated to exist amongst the age groups most affected by the disease namely the adolescents in the GWM. [12]

The trend analysis by sex shows more females than males being affected by the disease between the ages of 0 – 25 years. However, this trend reverses completely for those aged 26 years and above. A similar pattern is observed among TB patients infected with HIV in Ghana.[12] It has been documented that one of the risk factors of TB is proximity to the person infected with the disease.[11] As a result, sexual activity which involves very close contact serves to promote the spread of diseases whether infectious or contagious. Moreover, with recent reports suggesting early initiation of sex among teenagers most especially females, it is therefore not surprising to observe the infection rate of TB to be more pronounced in females than males at those teenage years.

It was observed that in those aged 26 years and above, the proportion of cases is higher in males than in females. This is the usual pattern of the disease in young adults and adults in general. [3] The usual tendency of males to be more daring and by their nature engage in more risky behaviours and lifestyles than females could be cited as some of the reasons why the infection rate of the TB is higher in males than in females for those aged 26 years and above.

A closer examination of the data revealed discrepancies between data recorded in the municipal TB register and those reported to DHIMS. However, at 95% confidence interval, the discrepancies proved not to be significant. This to a large extent shows that as far as data entry into the DHMIS is concerned, the TB coordinators in the municipality are doing well. Moreover, about 5% of all the data expected to be collected over the period were not collected at all. They either appeared as blanks or gaps in the TB register. Information on some variables such as residence of the case, type of TB patient, HIV status among others were simply not collected and were left as blanks on the register. Training more DCOs to man the sub-municipalities by the government and organizing refresher courses for TB coordinators in the municipality to enhance their data collection skills by the Municipal health directorate could help improve quality of data collected.

It can be stated that the scale of occurrence is not large enough to affect the reliability of the data, this tendency should be avoided at all cost to improve upon the quality of the data. Although several reasons can be mentioned as the cause of such negligence on the part of the one entering information into the register or the DHIMS, such

practices have the capacity to create a wrong picture of the reality in the municipality when it occurs on large scales.

On other occasions, the TB coordinator may not be on duty at the time a TB patient shows up for treatment. Such a case may be missed altogether or that patient's information may not be captured correctly. This brings to the fore the need to train more public health workers to augment the existing workforce. The submission of TB return forms to DCOs at the municipal level for data to be entered into DHIMS on behalf of sub-municipals also created room for data manipulation and wrong entry especially when the handwriting becomes difficult to read.

Limitations

One of the limitations of this study is the fact that the places of residence of some cases were not captured. We therefore put such data under a separate heading; Unknown. The proportions of such cases reveal that these numbers could not have significantly affected the distribution of cases. Also, the data we analysed was a secondary one and so did not lend itself to very rigorous statistical analysis to be performed on it. Despite all these limitations, the results as shared above are true reflections of the TB cases in GWM and can heavily be relied upon.

CONCLUSION

The 80% reduction target for incident cases may not be attained by the GWM due to the rising number of TB cases. The trend of the disease in the municipality remains in tandem with the rest of the country. The TB data quality is good.

ACKNOWLEDGEMENT

We would like to thank the Ga West Municipal Health Directorate and the surveillance department

REFERENCES

1. WHO. Global Tuberculosis Report 2016. WHO. Geneva, 2016. Available: http://apps.who.int/medicinedocs/documents/s23098en/s23098en.pdf. (Accessed on 20th March 2017).
2. Mcintosh J. Tuberculosis: Causes, Symptoms and Treatments. Medical News Today. 2016;(January):1–5. Available: https://www.medicalnewstoday.com/articles/8856.php. (Accessed: 26th January, 2017)
3. World Health Organization (WHO). Tuberculosis Fact sheet. WHO, Geneva. 2017.
4. Ghana Health Service. Monitoring and evaluation plan: Nation TB Control Programme. GHS, Accra. 2011.
5. Ghana Health Service. Report on 2017 World Tuberculosis Day Commemoration Theme : Unite To End TB. GHS, Accra. 2017.
6. WHO. WHO Global tuberculosis report 2015. WHO, Geneva. 2015
7. Ghana Health Service. Integrated Disease Surveillance and Response in Ghana. 2002. GHS, Accra, 2002.
8. MOH. The National Tuberculosis Health Sector Strategic Plan for Ghana:2009-2013. MOH, Accra. 2009.
9. Amenuvegbe GK, Anto F, Binka F. Low tuberculosis case detection: A community and health facility based study of contributory factors in the Nkwanta South district of Ghana. *BMC Res Notes*. 2016;9(1):330.
10. WHO. WHO Ghana - Annual Report 2016. WHO, Accra. 2017.
11. Millet JP, Moreno A, Fina L, Baño L Del, Orcau A, De Olalla PG, et al. Factors that influence current tuberculosis epidemiology. *Eur Spine J*. 2013;22(SUPPL.4).
12. GSS, GHS, ICF Macro. GDHS. Key Findings From the 2014 Ghana Demographic and Health Survey National Health Summit. GSS, Accra, 2015.