Application of Mortality Indices to Cases and Death Due To Tuberculosis in Bayelsa State Nigeria 2010 – 2012

Author’s Details: (1) Golden M I (2) Adu G J (3) Otoro L (4) Oguara R

(1)(2)(3) Department of Arts/Social Science Foundation, School of Foundation Studies, College of Health Technology, Ogbia, Bayelsa State, Nigeria. (4) Department of Science Foundation, School of Foundation Studies, College of Health Technology, Ogbia, Bayelsa State, Nigeria.

Abstract:
Background and Objectives: Tuberculosis has a high disease burden in Nigeria. With an annual mortality of 27,000, it constitutes one of the most life threatening diseases in the country. The nation needs to monitor the trend of a disease like this constantly with the appropriate statistics. This study aims at applying basic mortality indices to cases due to tuberculosis to establish its trend in Bayelsa State from 2010 – 2012.

Materials/Methodology: An archival/retrospective study design was used. Data was obtained from the tuberculosis referral Centre at Igbogene in Bayelsa State. The crude death rate, the prevalence rate, and the case fatality rate were calculated for the three years, with a null hypothesis stating that the prevalence rate of the disease in the state has not changed significantly within the three years. Chi Square was used to test changes in tuberculosis prevalence for the three years in order to establish the trend of the disease in the state. Excel statistical software was used to present the data into graphs, while Prism graph pad statistical software was used for the inferential statistics.

Results: The crude death rate due to tuberculosis in Bayelsa State was 16/1000 for 2010, 12/1000 for 2011 and 14/1000 for 2012. The prevalence rates were 32% for 2010 and 2011, and 36% for 2012, while the case fatality rate were 24% 2010, 36% for 2011 and 37% for 2012. The calculated chi-square was 0.1562 with df of 2, a P > .05 (0.9249). The null hypothesis was not rejected. There was no statistically significant change in the prevalence rate between the three years.

Conclusion: The trend of tuberculosis in Bayelsa State was fairly stable throughout 2010, 2011 and 2012. There was no significant change in all the rates calculated.

1. INTRODUCTION

Tuberculosis is a disease commonly called TB. It has been known to mankind since ancient times and has remained one of the most life-threatening diseases over the centuries. There has been a resurgence of tuberculosis worldwide since the prevalence of HIV/AIDS, though preventable and curable, it is now considered second only to aids as the greatest killers (Tuberculosis Fact Sheet, 2013).

Tuberculosis is a communicable disease caused by a bacterium called mycobacterium tuberculosis which is also called tubercle bacillus. It spreads from person to person and affects people of all ages. When someone with active tuberculosis infection coughs, sneezes or spits, the germ is propelled into the air. The germ stays alive in that exposed condition for a long time, and if inhaled that person becomes infected. The germ affects the lungs, and the infected tissues are invaded by macrophages, making the alveoli to stop functioning. Common symptoms are a dry cough later accompanied by sputum sometimes stained with blood, steady loss of weight, general fatigue, loss of appetite and chest pain (Basavanthappa 2008).

Today, even with the modern advanced diagnostic and treatment tuberculosis is still potent, and a third of the world’s population has been exposed to it, and 90% of those infected are in the developing world. AIDS induced infection alone is about eight million people, out of which two million has died. In 2012 over 8.6 million people fell ill with tuberculosis and 1.3 million died. Out of this 95% is in low and middle income countries (Mandal 2014, Tuberculosis Fact Sheet 2013).
Tuberculosis is a disease whose mortality indices remain stable once it has appeared unless concerted serious medical intervention takes place. Its prevalence is usually affected by social conditions such as income and educational level which determine housing and environmental conditions (Kaseliene & Kalediene 2011, Jung Bennion Sovillo Bellony 2010).

In Nigeria, tuberculosis is a disease of serious concern. Nigeria has the highest burden in Africa. It is the 10th most affected country in the world, with 84,263 new infections every year out of which 27,000 die annually. There are an estimated 190,000 people infected in the country (Dim & Dim 2013, Ibekwe 2013). A disease with this level of prevalence in the country requires the constant and committed attention from government and the whole health community. It needs constant monitoring which must make use of appropriate statistics that capture the trend and dimensions of the disease.

This study aims to apply basic mortality indices to cases and death due to tuberculosis in Bayelsa State from 2010 – 2012, to enable us to monitor the trend of the disease in Bayelsa State.

2. MATERIALS/METHODS

We used an archival/retrospective research design. Only existing data was used. This was obtained from the tuberculosis referral hospital at Igbogene in Bayelsa State. All treated cases were obtained for the three years under consideration, and the crude death rate, prevalence rate, and the cases fatality rate were calculated for the three years. Results are presented in tables, graphs, and charts. Chi Square was used to test changes in tuberculosis prevalence for the three years in order to establish the trend of the disease in the state. Excel statistical software was used to present the data into graphs, while Prism graph pad statistical software was used for the inferential statistics.

3. RESULTS

The crude death rates due to tuberculosis for 2010 – 2012

![Bar chart showing crude death rate of tuberculosis in years](image)

Fig.1 BAR CHART SHOWING CRUDE DEATH RATE OF TUBERCULOSIS IN YEARS

This bar chart showed the crude death rates in Bayelsa State for 2010 – 2012. 2010 has the highest rate of 16/1000 population, followed by 2012 with 14/1000 and 2011 with 12/1000. All the rates for the three years give a trend of two (2) unit difference.
The prevalence rates due to tuberculosis for 2010 – 2012

![Pie Chart Showing Prevalence Rate of Tuberculosis in Years](image)

**KEY**

1= 2010 PREVALENCE RATE (32%)
2= 2011 PREVALENCE RATE (32%)
3= 2012 PREVALENCE RATE (36%)

**Fig.2  PIE CHART SHOWING PREVALENCE RATE OF TUBERCULOSIS IN YEARS**

2012 has the highest prevalence rate at 36%, followed by 2011 and 2010 at 32% each. The rate was stable until 2012. Even this increase seemingly appears not significant.

The cases fatality rates due to tuberculosis for 2010 – 2012.

![Line Graph Showing Case Fertility Rate of Tuberculosis in Quarters](image)

**Fig.3  A line graph showing case fertility rate of tuberculosis in quarters**
This shows that case fatality rates at 24% for 2010, 36% for 2011 and 37% for 2012. Looking at the annual rate showed no significant movement in rate, it must be noted that the quarterly changes, particularly in 2012, were not only significant but very steep and sudden.

Table 1 above showed a chi-square value of 0.1562, a df of 2 with a $P > .05$ (0.9249). This implies that the null hypothesis is not rejected. This means there are no statistically significant changes between years in the prevalence rate of tuberculosis. See Prism Graph Pad output in Appendix A.

4. DISCUSSION

The crude death rate from 2010 to 2012 was fairly stable over the years. The rate fluctuated slightly between 16% in 2010 and 14% in 2012. These are significantly high figures, given that the 2010 projected population of Bayelsa State is just slightly above 1 million. The consideration of the prevalence rate from 2010 to 2012 also shows stable conditions. The rate was 32% in 2010 and 2011 but moved up slightly to 36% in 2012. The change though an increase was not very significant. But the figures considered in absolute terms are high. The prevalence rate of 36% in a disease like tuberculosis surely should raise the alarm in the health community. The calculation of the case fatality rate, however, shows a significant change between 2010 and 2011 from 24% to 37%. This too is high. But much more striking is the change in rate between quarters in the year. This is more pronounced in 2012 where rate difference was as far apart as 17% and 58%. Despite this, the end of year rate between 2011 and 2012 was very slight.

Most significant in our findings is the fairly stable prevalence rate over the three years. This could mean that either the preventive measures to stop the spread of the disease have not been effective or the curative measures have been good enough to keep it within the same range over the three years. This also shows that there have not been significant improvements in the housing and environmental conditions of the people, which have proved to be significant factors in the spread of tuberculosis. The dramatic increase in case fatality rates between 2010 and 2011 is significant too. Either drugs or treatment procedures were not effective, or a serious breach in the intervention process occurred due to lack of qualified personnel and equipment. Lack of information and the ability and capacity in record keeping by the referral hospital could also be a factor. These apart the prevalence of HIV/AIDS could be contributing.

These findings are in line with the findings of various similar studies. The high prevalence and crude death rates due to tuberculosis were significant conclusions in the studies carried out by Dim & Dim (2013) and Ibekwe (2013). Dim & Dim (2013) studied trends of tuberculosis prevalence in the Enugu State of Nigeria while Ibekwe (2013) relied on data provided by the Nigerian Medical Association. But they all emphasized that tuberculosis constitutes a high disease burden in the country and is killing daily.

Studies have also confirmed that the indices on tuberculosis remain stable over time. Kaseliene and Kalediene (2011) examined the trend of tuberculosis in Lithuania and established that the crude death rate due to tuberculosis was remained fairly stable throughout 2004 at 9%, 2005 at 10.8% and 2006 at 10.9%. Jung et al. (2010) also had similar findings in the USA when they considered mortality due to tuberculosis between 1990 and 2006. It in the USA it actually fell towards 2006.

5. CONCLUSION
This study concludes that the trend of tuberculosis in Bayelsa State has been stable, though with the slight increase in 2012. This means that the eradication of the social and environmental conditions that enable the disease to thrive in the state has not made significant progress in capacity and capability. This also implies that the medical intervention process has not improved. Both preventive and curative medicine in tuberculosis has not been able to bring down the rate.

6. **RECOMMENDATIONS**

- We should procure current treatment vaccines to treat the tuberculosis patients.
- We should concentrate on and increase the coverage of the immunization programme across the state to prevent new cases.
- We should improve the economic circumstances of the population and the environmental conditions in the state. Housing conditions should be improved to reduce the level of congestion, which will reduce the rate of spread of the disease.

**REFERENCE**


Tuberculosis Fact Sheet, No. 104, October 2013.

**Appendix A(Graph pad prism output)**

<table>
<thead>
<tr>
<th>Table Analyzed</th>
<th>Data 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chi-square</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Chi-square, df</strong></td>
<td>0.1562, 2</td>
</tr>
<tr>
<td><strong>P value</strong></td>
<td>0.9249</td>
</tr>
<tr>
<td><strong>P value summary</strong></td>
<td>ns</td>
</tr>
<tr>
<td><strong>One- or two-sided</strong></td>
<td>NA</td>
</tr>
<tr>
<td><strong>Statistically significant? (alpha&lt;0.05)</strong></td>
<td>No</td>
</tr>
<tr>
<td><strong>Data analyzed</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Number of rows</strong></td>
<td>3</td>
</tr>
<tr>
<td><strong>Number of columns</strong></td>
<td>2</td>
</tr>
</tbody>
</table>