Operational research on tuberculosis control in Malawi
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4. Differences in tuberculosis incidence rates in township and in rural populations in Ntcheu District, Malawi

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ABSTRACT

There has been a large upsurge of tuberculosis (TB) in many countries in sub-Saharan Africa, mainly as a result of the co-existing human immunodeficiency virus (HIV) epidemic. Malawi has had a well run National TB Control Programme (NTP) with good registration and recording of cases. For some years the NTP has had the impression that TB in the country is concentrated around townships and is less prevalent in the rural areas. This impression was investigated in a rural district (Ntcheu District) in Malawi. Data on new TB cases were collected from the district TB register for the years 1992 - 96 and average annual TB incidence rates per 100,000 for semi-urban and rural populations were calculated for this period. There was a significantly higher incidence of TB, particularly amongst cases with smear-negative pulmonary TB and extrapulmonary TB, in the semi-urban population compared with the rural population. Possible explanations could be higher HIV seroprevalence rates in semi-urban areas compared with rural areas, under-diagnosis at health centres or poor access to medical facilities for rural people.

INTRODUCTION

There has been a large upsurge of tuberculosis (TB) in many countries in sub-Saharan Africa, mainly as a result of the co-existing human immunodeficiency virus (HIV) epidemic. Since 1984, Malawi has had a well run National TB Control Programme (NTP) with good registration and recording of cases. For some years the NTP has had the impression that TB in the country is concentrated around townships and is less prevalent in the rural areas. There is also some preliminary evidence from a survey of district hospital laboratory sputum registers that TB tends to be concentrated around the townships or semi-urban areas of a district [1]. We investigated this impression and observation further by examining details of all registered TB cases in Ntcheu District in Malawi over a period of five years.

METHODS

Ntcheu District is situated in the Central Region of Malawi and has a catchment population of 478,000 (Population Estimates, National Statistics Office, Zomba). The main township area in which the district hospital is situated has had an average catchment population of 56,000 between 1992 and 1996 (Ntcheu District Hospital, Environmental Health Department) and is classified as semi-urban. The township is half-way on the national highway between the two largest cities (Lilongwe and Blantyre).
in Malawi with 3 fuel stations, 26 bottle stores (bars), 12 rest houses, a supermarket, 3 secondary schools and it is the district headquarters for the main government ministries. It is a popular overnight truck stop. The rest of the district is classified as rural with an average population of 422,000 between 1992 and 1996 (Ntcheu District Hospital, Environmental Health Department).

Registration and treatment of TB cases

TB suspects submit sputum either at the health centre or at the hospital. All smear microscopy for acid-alcohol fast bacilli is done at the district hospital laboratory and results are sent back to the health centres. If smear-positive the patient is referred to the District TB Officer and admitted for treatment in the TB ward. If negative but still suspect for TB the patient is referred to the hospital for review by the Clinical Officer. All smear-negative pulmonary tuberculosis (PTB) and extrapulmonary tuberculosis (EPTB) diagnoses are made in hospital after further investigations (e.g., X-radiology, biopsy) and consultation with the District Medical Officer. All TB patients receive the intensive phase of their treatment as in-patients and are discharged at the beginning of their continuation phase to continue their treatment at home on an ambulatory basis and report to their nearest health centre for drug collection.

Data collection and analysis

Data on new TB cases were collected from the District TB register for the years 1992 - 96 and included: age, sex, type of TB, and home address (i.e. village where the patient lived and health centre where the patient collected drugs during the continuation phase of treatment). TB incidence rates per 100,000 for each of the five years were calculated for the semi-urban and rural populations, and an average annual incidence rate was calculated for this period. Differences in proportions were compared with $\chi^2$ tests. Risk ratios (RR), their 95% confidence intervals (CI) and $P$ values were calculated and are presented for all comparisons that were significantly different at $P<0.05$.

RESULTS

During the five year period there were 2019 registered cases of TB: 955 with sputum smear-positive PTB, 508 with smear-negative PTB and 556 with EPTB. Case finding for the period 1992 – 96 is shown in Table 1. Average annual incidence rates for all cases of TB (and for each type of TB) and the risk ratios are shown in Table 2. There was a significantly higher incidence of TB, particularly amongst cases with smear-negative PTB and EPTB, in the semi-urban population compared with the rural
population. These significant differences were also found between semi-urban and rural populations when the analysis was performed separately for males, for females, for adults aged ≥5 years and for each of the years 1992 – 96.

**Table 1. New tuberculosis cases in Ntcheu District, Malawi, 1992 – 1996.**

<table>
<thead>
<tr>
<th>Tuberculosis type</th>
<th>Semi-urban (Population 56,000)</th>
<th>Rural (Population 422,000)</th>
<th>Total number of cases in Ntcheu District (Population 478,000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>All cases</td>
<td>555</td>
<td>1464</td>
<td>2019</td>
</tr>
<tr>
<td>Smear-positive pulmonary</td>
<td>226 (41%)</td>
<td>729 (50%)</td>
<td>955 (47%)</td>
</tr>
<tr>
<td>Smear-negative pulmonary</td>
<td>179 (32%)</td>
<td>329 (22%)</td>
<td>508 (25%)</td>
</tr>
<tr>
<td>Extrapulmonary</td>
<td>150 (27%)</td>
<td>406 (26%)</td>
<td>556 (28%)</td>
</tr>
</tbody>
</table>

**Table 2. Tuberculosis incidence rates in Ntcheu District, Malawi, 1992 - 1996**

<table>
<thead>
<tr>
<th>Tuberculosis type</th>
<th>Case Registration Rate/100,000</th>
<th>Relative Risk (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semi-urban</td>
<td>Rural</td>
<td></td>
</tr>
<tr>
<td>All cases</td>
<td>198</td>
<td>69</td>
</tr>
<tr>
<td>Smear-positive pulmonary</td>
<td>81</td>
<td>35</td>
</tr>
<tr>
<td>Smear-negative pulmonary</td>
<td>64</td>
<td>16</td>
</tr>
<tr>
<td>Extrapulmonary</td>
<td>54</td>
<td>19</td>
</tr>
</tbody>
</table>

* Case registration rate/ 100,000 = average annual tuberculosis incidence rate per 100,000 during the 5-year period 1992 - 1996

**DISCUSSION**

This study shows that in at least 1 district in Malawi cases of TB were concentrated around the township area rather than in the rural area. Ntcheu is similar to many other districts in Malawi with the township area situated along a major road highway, and it is possible that these findings would be replicated elsewhere. Although patients from the rural areas might have come directly to the hospital for diagnostic services, thereby bypassing the health centre, this does not bias the incidence rates for the semi-urban and rural populations as they have been calculated according to domicile at the time of diagnosis and not according to the site of diagnosis. There are a number of possible reasons for the findings. HIV seroprevalence rates in women attending antenatal clinics are higher in semi-urban areas compared with rural areas [2], and this may lead to greater rates of TB either through reactivation of
disease or increased susceptibility to new infections [3]. Second, it is possible that screening for TB is not carried out correctly or diligently at rural health centres, leading to an under-diagnosis of TB in the rural population. Third, access to health centres or the hospital may be difficult for rural people. However, there is reason to believe that transmission outside the household is of much more importance than suspected [4]. We cannot therefore be sure whether the village of residence represents the place where TB was acquired. Further work will need to be done to determine whether the different rates of TB are due to differences in HIV infection or due to difficulties faced by rural people in accessing diagnostic services. During the coming national HIV seroprevalence survey amongst TB patients the place of residence (urban/ semi-urban/ rural) should be taken into account to detect any patterns according to residence. Meanwhile the NTP should maintain a high level of awareness of TB amongst health workers through regular briefings on passive case finding.

References
