Author’s response to reviews

Title: Joint Special Issue E.21: Training front-line health workers for tuberculosis control in developing countries: lessons from Nigeria and Kyrgyzstan

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Version: 2 Date: 25 August 2008

Author’s response to reviews: see over
Training of front-line health workers for tuberculosis control in developing countries: lessons from Nigeria and Kyrgyzstan

Response to referee 1 (Prof. Vaira Leimane)

Dear Prof. Leimane,

Thanks very much for your succinct review of our manuscript. We have attempted to incorporate most of your valuable suggestions in the revised version. We respond to your comments as follows:

Major compulsory revisions

- We have provided more analysis and description of the differences and similarities between the tuberculosis and demographic profile of Kyrgyzstan and Nigeria. We have not described the differences and similarities in the Table as we believe it is self-explanatory. For emphasis, there is currently, to the best of our knowledge, no ‘pure’ vertical or horizontal tuberculosis control programs in developing countries. All nations have a mix of both vertical and integrated components. However, the mix of the Nigerian tuberculosis program is currently more towards the integrated end of the spectrum (albeit poorly functioning), while that of Kyrgyzstan is currently more towards the vertical end of the spectrum, although new funding initiatives are likely to make it at least combined with HIV and/or common respiratory diseases. As at January 2007, the organizational structure of the Kyrgyzstan TB program is as shown below. It is currently under review, in line with plans to introduce combined programs. That of the Nigerian program is currently under review (http://host1.maasinfotech.com/healthministry/search.php), but as at 2004 when the Nigeria’s Workers Manual was first developed, the vertical component of the program is of similar structure at the Federal level, but at the state and local government levels, it is poorly structured in practice, and not necessarily reflective of how the program actually works, since private medical practitioners and herbalists treat at least a third of TB cases but are not included in the organigram (http://www.soros.org/initiatives/health/focus/phw/articles_publications/publications/civilsociety_20061101/nigeria_20061030.pdf). The important point about the organigram in relation to our article is that no training position is specifically included in the national components of the Kyrgyzstan and Nigerian programs, even though the National Tuberculosis Institute and the National Tuberculosis and Leprosy Training Centre are actively involved with training. This under-emphasis on training in tuberculosis program structures in developing countries contributes to poor funding and poor quality training.

- The self-explanatory table provides basic TB-related statistics for the two countries. We have added several new rows of statistical information to enable readers better compare the socio-economic, epidemiological, and human resources profile. These statistical data, we believe, speak for themselves.
The estimates for density of health care workers that we proposed is based partly on data available from literature (references 16, 17, 18 and 20) and from our collective work and training experience in the two countries. Compared to the African average of 2.3 health workers per 1000 inhabitants, Nigeria has obvious deficits in human resources for health services in general, and tuberculosis control in particular. Based on the World Bank estimates and commentaries, (Table shown below), Kazakhstan and Kyrgyzstan were viewed as having slightly more doctors than required for optimal TB control, while Uzbekistan was regarded as having far too much. We believe that, by introducing the cadre of tuberculosis control supervisors into the HCW mix, the average TB doctor in developing countries can manage to look after 24 TB
patients at any point in time effectively. Doctors’ pay is low in Central Asia and there are more than enough Kyrgyz doctors trained already, hence the apparent insensitivity of health ministry budget planners to the liberal employment of this high-cost cadre in tuberculosis control programs.

Table 10: Infrastructure of TB Services in Central Asia

<table>
<thead>
<tr>
<th></th>
<th>Kazakhstan</th>
<th>Kyrgyz</th>
<th>Tajikistan</th>
<th>Uzbekistan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population (millions)</td>
<td>15</td>
<td>5.0</td>
<td>6.3</td>
<td>25.3</td>
</tr>
<tr>
<td>TB Beds</td>
<td>12,512</td>
<td>3,011</td>
<td>2,270</td>
<td>11,230</td>
</tr>
<tr>
<td>TB Beds per 100,000 population</td>
<td>83.4</td>
<td>72.2</td>
<td>36.0</td>
<td>44.4</td>
</tr>
<tr>
<td>TB Beds per 1,000 patients</td>
<td>552</td>
<td>585</td>
<td>560</td>
<td>863</td>
</tr>
<tr>
<td>TB Doctors</td>
<td>1,346</td>
<td>360</td>
<td>108</td>
<td>1,449</td>
</tr>
<tr>
<td>TB Doctors per 100,000</td>
<td>9</td>
<td>7.2</td>
<td>2.7</td>
<td>5.7</td>
</tr>
<tr>
<td>TB Doctors per 1,000 patients</td>
<td>55</td>
<td>58</td>
<td>42</td>
<td>73</td>
</tr>
<tr>
<td>Patients per TB Doctor</td>
<td>13</td>
<td>17</td>
<td>24</td>
<td>14</td>
</tr>
<tr>
<td>Dispensaries</td>
<td>334</td>
<td>17</td>
<td>63</td>
<td>111</td>
</tr>
<tr>
<td>Dispensaries per 100,000</td>
<td>2.2</td>
<td>0.3</td>
<td>1.0</td>
<td>0.4</td>
</tr>
<tr>
<td>Dispensaries per 1,000 patients</td>
<td>2.5</td>
<td>0.5</td>
<td>2.8</td>
<td>1.0</td>
</tr>
<tr>
<td>TB Laboratories</td>
<td>510</td>
<td>158</td>
<td>70</td>
<td>289</td>
</tr>
<tr>
<td>TB Labs per 100,000</td>
<td>3.4</td>
<td>3.2</td>
<td>1.3</td>
<td>1.1</td>
</tr>
<tr>
<td>Network exists</td>
<td>Partially</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Quality assurance</td>
<td>Partially</td>
<td>Certified</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>NRL</td>
<td>Yes</td>
<td>Certified</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Source: Central Asia TB Institutes 2003

- The World Bank report appraises the Kazakhstan project as the relatively most successful in central Asia:

In terms of tuberculosis control in Central Asia, Kazakhstan is relatively successful. After experiencing a surge in TB in the 90s, the country is now taking measures to decrease the burden of disease due to TB permanently. Between 1998 and 2004, the number of notified cases has declined by 3,000, and the mortality rate associated with TB declined by 45 percent. In some oblasts, case fatality has been reduced to 2 percent. The prison system is one of the sectors that most benefited from this reduction. However, none of the authors have practical experience working in Kazakhstan, we decided to focus on Kyrgyzstan.

- By “prison/rural posting package”, we mean financial and non-financial incentives that selectively advantage individuals willing to work in areas of high tuberculosis prevalence, but which have difficult “terrain” such as prisons and rural areas. We have detailed examples of such incentives in the revised text. By “productivity mix”, we mean the structural, process and individual factors that result in optimal health outcomes. In relation to tuberculosis human resources, these include working conditions, training to obtain adequate knowledge, skills and attitude, accountability for procedures, and performance indicators, job satisfaction, and motivation. These issues are discussed in the revised manuscript. By “undergraduate” training, we mean training acquired following high school to obtain basic qualifications in a health specialty, such as BSc (Nursing) or MBBS (Medicine). Post-graduate training refers to specialized training following the first tertiary qualification, such as fellowship qualification and Master of Public Health or TB specialist training. The phrase “front-line workers” in relation to TB control was
popularized by the slogan of the 2005 World TB Day. Our use of front-line health workers narrows this generic phrase to four cadres of health workers involved with TB work: doctors, nurses, tuberculosis control supervisors and laboratory staff. This point was explained in the revised manuscript.

- The Malawi NTP program (reference 36) was only referred to in explaining how addressing other factors concurrently with training may help to accelerate productivity gains compared with addressing training shortfalls piecemeal. We were unable to access published work from Central Asia that fully illustrates this point. We have added a reference from Kazakhstan (reference 37) which partly supports the Malawi article.

- We know that developing countries under-fund training programs because the official budgets for TB control in developing countries do not generally account for training expenses. As explained in the article, this is illustrated by the $US1 and $US14 million current TB budgets by Kyrgyzstan and Nigeria, which just barely cover staff salaries. This under-funding is also documented in WHO TB reports, as stated in the manuscript.

- Since, generally, “he who pays the piper dictates the tune”, the influence of NGO that donate TB training funds on the structure of TB programs in developing countries is substantial. This point is explained in the revised article.

- While advanced skills and technology will make distance learning more efficient, it is not mandatory that Internet systems precede Distance Learning implementation. I am currently involved with setting up a public health department at the National Open University of Nigeria, where most of our learning activities take place via mail correspondence as well as radio narrowcast. It is possible to use there ‘old-fashioned’ approaches to initiate Distance learning in resource-poor countries, while taking advantage of newer technologies, subject to affordability (http://unesdoc.unesco.org/images/0012/001284/128463e.pdf).

Minor and discretionary revisions

- The aim of using Kyrgyzstan and Nigeria as case studies for training needs in developing countries was not to make case by case comparisons, but to highlight issues in either or both of the countries in strengthening our argument regarding training issues for tuberculosis control. Nevertheless, we have attempted to improve the comparability of data discussed in relation to the two countries in the revised manuscript.

- The WHO pre-DOTS and post-DOTS WHO strategy for TB control provides broad guidelines for training, but such guidelines are not enforceable. They depend on the political will of host governments, the training culture in each country or region, and the priorities of donor agencies that fund training programs. We have no doubt that training programs for general health workers and for tuberculosis workers are different in many structural areas, such as community health officers for tuberculosis control.

- The Kyrgyz NTI only provides data for TB patients treated at the centre. This is in part because non-TB patients (e.g. dermatology patients) will not be referred to the NTI. We only used the data to show how far the Nigerian TB program structure is progressing towards the integrated spectrum, compared with the Kyrgyz TB program structure.
We believe having an international consensus on the ideal mix of tuberculosis health care workers would encourage nations to restructure their national and regional training priorities accordingly. For instance, in our article, we suggested that all developing nations should invest in the training of community health officers as tuberculosis control officer, partly because of the relatively low cost of training and hiring such staff, as well as the greater likelihood that they can be retained in underserved rural areas where it will be difficult to attract and retain qualified doctors and nurses.

We were only able to obtain Kyrgyzstan specific data in relation to health care workers density statistics. We welcome advice on published articles that have comparable data in this regard. The seminal 2006 study by the World Bank (ref. 17) would have provided this information, but Turkmenistan was not included in the countries surveyed.

We have provided more information on the type of revision of training curriculum that may be gainfully conducted in consultation with WHO in the revised manuscript. An example is given in ref. 21 and 27. The WHO has well qualified staff who can coordinate such training in consultation with national medical, nursing and laboratory technology training staff.

While the NTBLTC is the only centre that awards diplomas for trainee leprosy supervisors, other training sites (e.g. Ossiomo TB/Leprosy Centre in Nigeria’s mid-West) offer tuberculosis training for local staff, but such training are regarded more as in-service training rather than accredited training. Most of the locally trained staff eventually proceed to NTBLTC for certificated tuberculosis supervisors’ training. Other cadres of frontline staff (i.e. doctors, nurses and laboratory technicians) undergo specialty training in teaching hospitals across the nation. All the NTBLTC and post-graduate nursing, medical and laboratory technology training programs are accredited nationally.

As stated earlier, as the manuscript is not simply a comparative study of Kyrgyzstan and Nigeria tuberculosis training systems, it is neither necessary nor desirable to attempt a case-to-case comparison on all issues discussed. The range of incentives offered by Kyrgyzstan government to TB workers are different from those offered Nigeria’s government, but the important point is to point out the different types of incentives that policy makers in developing countries can adopt, as we have attempted to do in the revised manuscript.

In Kyrgyzstan, the practice of allowing prison health care workers to be eligible for pension in half the time it takes other public service workers to access pension is an example of prison health worker incentive package. We have provided examples of rural/prison package in the revised manuscript.

We define motivation as an individual’s degree of willingness to exert and maintain an effort towards organizational goals in relation to tuberculosis control. Motivational activities are diverse, and include job satisfaction, adequacy of drugs and facilities to deliver quality health care, financial and non-financial incentives, stable career path, training opportunities and good program outcomes. There are currently few motivational activities in the Nigerian TB program especially in relation to training opportunities, compared with the Kyrgyzstan, as described in the revised manuscript.

Section two of the survey referred to in reference 3 (http://www.human-resources-health.com/content/3/1/2) provides information on Health resource gaps, which determine training and staffing needs for TB control. More

- Training for effective evaluation of tuberculosis programs requires leadership at the international level, to identify best practices (e.g. in the Netherlands), and organise training of trainers’ evaluation courses in developing countries. This is our position in the revised manuscript.
- HRH is an open-access journal with a wide leadership. It is one of only several high quality specialized journals specifically addressing issues relating to developing optimal and well trained health workforce.
- We have provided data on how Nigeria lags behind in training, both by international standards and in relation to Kyrgyzstan, in the revised manuscript.
- In our manuscript, ‘frontline staff’ relates to ‘frontline TB staff unless otherwise stated. In Nigeria, because of the more integrated nature of training programs, frontline TB staff work concurrently as frontline PHC staff.
- Being an Open-access journal, our target audience will have free Internet access to this publication, if accepted.
- The lessons from Nigeria and Kyrgyzstan include; (1) poor human resources development for TB control is a common cause of poor TB program outcomes, especially in Nigeria; (2) training is capital intensive, but few developing countries invest adequately in it; (3) while the general trend is towards human resources shortages (e.g. Nigeria), many countries in Central Asia and eastern Europe appear to have surplus health workers (e.g. Kyrgyzstan); (4) donor agencies have strong influence on training program, and such influence may conflict with host nations’ training priorities (5) training incentives may be used to improve human resources capabilities for tuberculosis control in developing countries. These are examples of many lessons regarding TB training from Nigeria and Kyrgyzstan, documented in our manuscript. Determination of current knowledge and skills deficit is beyond the scope of this manuscript. A properly defined training evaluation framework, as suggested in the manuscript will provide evidence base for determining gaps in health care workers’ knowledge and skills.

Response to referee 2 (Dr. John Hall)

Dear Dr. Hall,

We sincerely appreciate your concise and constructive comments on our manuscript. We have attempted to incorporate your suggestions into our revised manuscript. We, in addition, respond to your comments below:

Major compulsory revisions:

3) We made this statement in the context of NGO participation in training programmes in Nigeria up to 2005. For example, while NA was tuberculosis control officer between 1990 and 1995, the Netherlands NGO funding his project was focussed on funding leprosy, and to a lesser extent, tuberculosis vertical programmes. The NGO’s leadership were well aware of the limitations of vertical programmes and the advantages of integrated programmes, but they believed that vertical programmes cannot be integrated until a number of conditions were met by host governments (http://www.lepra.org.uk/Ir/june02/0002.pdf). Over the past several years, and
especially with the formation of the Global Fund, governments in Nigeria and most developing countries have been working towards meeting the pre-requisites for integrated services. Based on NA’s experience with TB training programmes as Director of Nigeria’s tuberculosis and leprosy training centre between 1991 and 1993, NGOs appear to prefer the funding of vertical training programmes, as this provides for greater accountability and allows for a clearer monitoring of human resources development returns on their substantial training investments. We agree that this statement is subject to misinterpretation, and have revised it accordingly in the updated version of our manuscript.

4) In relation to leprosy, reverse integration means bringing other health care services into existing leprosy services ([http://www.aifo.it/english/resources/online/apdrj/apdrj0106/reverseintegration-nigeria.pdf](http://www.aifo.it/english/resources/online/apdrj/apdrj0106/reverseintegration-nigeria.pdf)). This process became apparent in Nigeria as funding for leprosy programmes continued to outstrip funding for general health services on a per capita basis. Also centres that provide leprosy treatment services are fee-free, while general health service centres charge for consultation and drugs. The financial benefit of fee-free consultation for patients made leprosy centres a magnet for indigent patients, and increasingly for mainstream patients seeking quality health care. Tuberculosis training has been a major beneficiary of reverse integration of leprosy services in Nigeria, since increasing attendance of TB patients encouraged NGO to allocate more funding for TB training of Nigerian health workers. We have attempted to briefly expand on this concept in the revised manuscript.

5) We have attempted, in the revised version, to clarify which of the ratios cited relate specifically to health workers, and which relate to specialised TB workers. We believe that integration does not imply the abolition of specialised tuberculosis services, so both ratios are required. However, although we modelled what we consider an optimum human resources mix for the specialised component of TB human resources mix, the citations for available actual health worker ratios for specialised TB workers and general health staff in Nigeria and Kyrgyzstan were obtained from WHO, Kaiser Family Foundation’s “World Health Facts”, and World Bank estimates. The sources of these figures are duly referenced in the revised article.

6) The most authoritative review on the quality of TB training in developing countries so far is the WHO 2005 study ([http://www.human-resources-health.com/content/3/1/2. Accessed 21 September 2007](http://www.human-resources-health.com/content/3/1/2. Accessed 21 September 2007)), which, as we stated, indicated major gaps in adequacy and uniformity of training. The most commonly used measures for health services performance are the extent to which countries meet the WHO target of detecting 70% of new, smear positive TB cases and cure 85% of these cases. Not only is case detection very difficult to estimate in developing countries due to poor quality data ([http://www.cdc.gov/ncidod/eid/vol10no9/pdfs/04-0349.pdf](http://www.cdc.gov/ncidod/eid/vol10no9/pdfs/04-0349.pdf)), treatment outcomes are confounded by factors other than trained staff, such as unavailability of drugs. While we have provided official estimates for case detection and cure in Nigeria and Kyrgyzstan in Table 1, we were more concerned, in this article with proposing more comprehensive and more reliable approaches to monitoring training quality and health worker performance to supplement the two indicators currently in use. We have included two sentences in the revised manuscript to highlight our perspective,
and suggested several underused approaches for assessing quality of training and health worker performance in our revised manuscript.

7) Unfortunately, it was not possible to obtain accurate data on actual numbers regarding distribution of health workers in different regions in Nigeria and Kyrgyzstan. We know from the cited 2005 World Bank report that while distribution of specialized TB workers is critical in the Former Soviet Union where primary care staff have limited knowledge about TB diagnosis and treatment, the situation in Kyrgyzstan with regards to the distribution of TB workers nationwide has been satisfactory. NA’s and IS’s experience with Kyrgyzstan’s prisons indicate what would normally be considered an over-supply of full-time medical TB specialists in urban and rural prisons in Kyrgyzstan. Thus, reasons for Kyrgyzstan’s success with distribution relate to (a) equitable distribution of resources (The cited 2005 World Bank Report stated that, at 3.5, the ratio between the highest and lowest funded oblast is the lowest in central Asia); (b) incentives of $2.20 paid to TB specialists per patient diagnosed and cured in relatively poorly funded regions, and (c) over-supply of TB specialists and limited employment opportunities in the private sector have enabled the government to effectively distribute front-line TB workers equitably to areas of need. We provided several reasons why such equitable distribution was achieved. In Nigeria, however, it follows that if the absolute numbers of almost all cadres of health workers is inadequate, and if TB specialty is stigmatised and TB work in remote regions and prisons is not supported adequately by incentives, then the absolute numbers and distribution of TB workers will be significantly uneven and inadequate. The situation TB health staff in Nigeria is complicated by the fact that health workers in the private sector also treat TB patients on a business model, but such data are hardly notified to the State or National TB programme managers. Again, we provided reasons for our observation on Nigeria, and included available data for training of tuberculosis supervisors. As there were no reliable accessible data on the distribution of TB staff in Nigeria and Kyrgyzstan (and indeed in most developing countries), we proceeded to offer suggestions on how to encourage equitable distribution of TB frontline workers, while suggesting urgent initiatives to address the information gap with regards to health workers’ distribution data in developing countries.

8) We have revised the manuscript such that the conclusion section essentially re-states the key points earlier made in the paper. We kept the example of Malawi’s and Kazakhstan’s experience with adequately addressing major facets of the TB “productivity mix” in the concluding part, as we already discussed the importance of the TB “productivity mix” in the introductory section.

Minor essential revision
9) We have updated the data in Table 1 using the most current WHO TB annual report, and have acknowledged same appropriately.
of improving human resources capability for tuberculosis control in developing countries. Thank you!

Sincerely,

Niyi Awofeso,
Corresponding author.