The impact of media-based health education on tuberculosis diagnosis in Cali, Colombia

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Tuberculosis (TB) is one of the most worrying infectious diseases facing less developed countries. Diagnosis and treatment of those who are transmitting Mycobacterium tuberculosis is considered a very effective control strategy. Within this strategy the priority is to achieve high cure rates before attempting to increase case finding. However, there is a dearth of research on how to increase case finding and diagnostic coverage in those settings where high cure rates are being achieved. This paper presents an evaluation of the impact on case finding of a mass media health education campaign for TB control in Cali, Colombia. The campaign aimed at increasing case finding and reducing levels of prejudice against people with TB. The impact assessment shows that the campaign produced an increase of 64% in the number of direct smears processed by the laboratories and an increase of 52% in the number of new cases of positive pulmonary TB, with respect to the previous period. Unfortunately, the effects of the campaign were short-lived. These findings have at least two important implications. First, passive case finding is likely to be an insufficient strategy to reach the operational targets of diagnostic coverage. Secondly, providing basic information about the earliest symptoms of TB and the procedures for diagnosis can increase diagnostic coverage, and thus strengthen the effect on infection risk of control programmes with high cure rates. Further research is required to identify other strategies that could, first, increase diagnostic coverage and, secondly, make the intervention effects sustainable.

Introduction

The control of tuberculosis (TB) is a high priority of social and health care policies in many countries, especially less developed countries (LDCs). Indeed, the disease is responsible for 26% of all the avoidable deaths in LDCs, and the cause of 3 million deaths annually, worldwide (Raviglione and Luelmo 1996). Although the nature of the distal causes of TB is socio-economic (Farmer 1996; Jaramillo 1999b), medical health care can substantially reduce its burden in both developed countries and LDCs. The most effective medical strategy for TB control, so far, is to find suspect cases, diagnose with direct smears those transmitting the bacteria (case finding) and then treat them by short-course chemotherapy under supervision of health care workers (HCWs). This is the basis of the so-called direct observed therapy short-course (DOTS) promoted by the World Health Organization.

Two fundamental elements are needed for this strategy to succeed: first, efficient health care services, making it feasible for people with tuberculosis (PWT) to have an early diagnosis and to adhere to treatment; and secondly, individuals and communities who are well informed about TB and its means of control. Indeed, I have argued elsewhere that poor education on TB of PWT and HCWs is one of the fundamental problems of the current strategy of control (Jaramillo 1999b). Thus, community health education on the process of this strategy for TB control is extremely relevant, and may be particularly useful in those settings where high cure rates are already achieved.

Community education in the basics of TB epidemiology may help to increase case finding, reduce diagnosis delay and promote adherence to treatment (Jaramillo 1998b).

This paper presents an evaluation of the impact on case finding of a mass media health education campaign for TB control carried out in Cali, capital of the department of Valle del Cauca, Colombia. The campaign aimed at increasing case finding and reducing levels of prejudice against PWT. It was sponsored by an alliance of the Secretariat of Public Health of Cali (SPH C) and the Colombian League Against Tuberculosis and Lung Diseases, Chapter of Valle (LAC-Valle), a non-governmental organization. The assessment of impact shows that the campaign produced a huge increase in the number of PWT, with respect to the previous period. Unfortunately, the effects of the campaign were short-lived. These findings have at least two important implications. First, passive case finding is likely to be an insufficient strategy to reach the operational targets of diagnostic coverage. Secondly, providing basic information about the earliest symptoms of TB and the procedures for diagnosis can increase diagnostic coverage, and thus strengthen the effect on infection risk of control programmes with high cure rates. Further research is required to identify other strategies that could, first, increase diagnostic coverage and, secondly, make the intervention effects sustainable.

Background

The characteristics of Cali, its public health care system and the TB control programme at the time of the campaign have been described elsewhere (Jaramillo 1998a). Briefly, Cali is a city of 2 million people, around 34% of whose basic needs are not met (Secretaría de Salud Pública Municipal 1994). Homicides, cardiovascular diseases and motor-vehicle accidents are the main causes of death (Secretaría de Salud Pública Municipal 1994). In 1993, the annual rate of new cases of pulmonary TB with a positive direct smear, notified to the SPH C,
was 35 per 100,000 inhabitants. TB incidence was not seriously affected by the epidemic of human immunodeficiency virus (HIV) when the campaign was delivered. In fact, less than 6% of new cases of TB were co-infected with HIV in 1993 (Crespo et al. 1994).

In Cali, the Tuberculosis Control Programme is a free health care service delivered by the SPHC, which follows the guidelines given by the World Health Organization. In fact, the programme is based on passive case finding of sources of infection (individuals with chronic respiratory symptoms who have a positive direct smear test), and administration to these individuals of short-course chemotherapy under supervision of a HCW. A high the cure rate in most of the health care units was over 80%, the programme had several problems in terms of coverage, management, and education of HCWs and community. By 1993 the SPHC and the LAC-Valle launched a programme aimed at increasing the coverage of diagnostic and treatment services, improving managerial efficiency in the services provided by the control programme, and finally, increasing the education level on TB of HCWs (Jaramillo 1995). Only when these goals had been achieved, a mass media health education programme in TB control was delivered.

Programme theory and design of the campaign

Formative research carried out in Cali regarding lay beliefs about TB showed two important findings. First, TB was regarded as a stigmatizing condition by PWT, the community and HCWs (Jaramillo et al. 1995), and secondly, coughing for more than 15 days (the earliest symptom of TB) was not worrying unless some other symptoms, such as weight loss or fever, were present (Jaramillo 1998a). The latter fact contributes to some extent to a delay in diagnosis, and to higher costs of health care seeking practices. The formative research also showed that the indications and procedures for demanding a direct smear test, as well as the costs, were unknown to members of the community and to many HCWs, which was also contributing to delayed diagnosis and to low efficiency in case finding activities.

The specific objectives of the media programme were to decrease the prevalence of prejudice against PWT, and to increase the demand for direct smears in the labs of the SPHC. The programme theory postulates that the low demand for smear tests is explained (provided that passive case finding by HCWs is at an optimum) by lay ignorance about early TB symptoms and the costs of diagnosis (Jaramillo 1998a). Provision of the relevant information using social marketing techniques would, thus, increase the demand for diagnostic tests. The media campaign consisted of three components according to the media source employed (see Table 1), and was implemented during 6 weeks from April 8 until May 20, 1994. The television and radio components consisted of public service announcements and chat shows involving discussion between PWT, doctors specializing in respiratory diseases, and managers of the campaign.

The printed component of the health education programme consisted of flyers inserted in one Sunday issue of two local newspapers, and two feature articles in one broadsheet and two tabloid newspapers, which highlighted the main messages of the campaign. Overall, the messages transmitted through the three components of the campaign conveyed information about the following:

- TB as a potentially fatal disease if left without treatment.
- Mechanisms of TB transmission.
- Coughing as the earliest and most important symptom of TB.
- The availability of a free diagnostic test.
- Attendance at a diagnostic facility if a cough lasts more than 15 days.
- The availability of a safe, effective treatment to cure the disease.
- Developing a favourable attitude towards PWT instead of avoidance or discrimination.

Methods

A quasi-experimental design is the most appropriate model to evaluate this campaign. A randomized community trial (the gold standard for evaluation of intervention impact at community level) was not possible for three reasons. First, for this study, communities suitable for participating in such a randomized trial would have needed, as minimum requirements, public health institutions fully committed to running an efficient TB control programme, as well as an appropriate mass media network. Suffice it to say that by 1994 only three cities in Colombia, including Cali, were running an adequate TB control programme. Secondly, the Ministry of Health of Colombia, which has the power and resources to improve the performance of the TB control programme, lacked the political will and, perhaps, the resources to engage in such evaluation. Thirdly, this campaign was the initiative of local institutions that lacked the power to fulfill the functions of the Ministry of Health mentioned above, and also lacked the capacity and the resources to engage in a highly complex project like a randomized community trial.

Assessing the effects of the intervention on the demand for direct smears requires analysis of the changes in demand. This was accomplished by counting the total number of smear tests stained in the laboratory network of the intervention TB control programme. In order to rule out the usual validity threats on a simple time series, a control group was added [see Cook and Campbell (1979) for a detailed discussion of validity threats to quasi-experimental designs]. This evaluation design is based on the fact that the demand for smears was adequately met by all the labs of the programme in both the intervention and the control, and aims to assess the immediate and the mid-term impact of the campaign.

The control group chosen was the population of Risaralda, a department bordering the north of the department of Valle del Cauca. This department is similar to Cali in terms of health care services, epidemiological profile, and quality and standards of the TB control programme. Although the sources used by the campaign made it likely that a substantial proportion of the population of the whole department of Valle had been exposed to the media campaign, there are
several reasons for comparing only the population of Cali with the population of the department of Risaralda. First, only those radio and television stations based in Cali, which have full coverage of the city but poor coverage in the rest of the department, were employed in the campaign. This made the exposure of the population of Valle to the campaign less certain than for those living in Cali. Secondly, the reliability of surveillance data on TB for the department of Valle was not as good as it was for Cali, lessening the quality of any evaluation. Thirdly, the public health-care services of Valle were not in a position to meet a potential increase in the demand for direct smears, making it difficult to measure the real impact of the campaign. Finally, the number of tests carried out in Pereira, the capital of Risaralda, was too small for an adequate comparison with Cali.

The epidemiological surveillance systems for TB in Cali and Risaralda use the same definitions in the gathering of data and report their results in the same format provided by the National Programme for Tuberculosis Control. The supervision of those HCWs attending PWT and collecting and processing the epidemiological data is based on the same criteria of quality assessment. In addition the programme in Risaralda has had an excellent record of efficiency and effectiveness from the late 1970s. These facts make feasible and appropriate any comparison between both populations.

Results
Table 1 shows the results of case finding activities (the number of direct smears, of people tested, and of new cases of positive pulmonary TB) reported by the SPHC and the Departmental Secretary of Health of Risaralda in the period 1993–95. Each individual who requests a smear test for diagnosis of TB must provide the lab with three sputum samples. However, as Table 1 shows, most of these individuals do not deliver all three samples. In fact, in both Cali and Risaralda an average of 2.3 direct smears were delivered per individual during the period assessed.

Data for the number of smears performed and the number of people tested for TB in Cali and Risaralda during 1993–95 are depicted in Figures 1 and 2 respectively. It is clear that the baseline for the control group is comparable to the intervention group baseline for both the number of smears stained and the number of individuals tested.

Figure 1 shows for direct smears a baseline level altered at I–93 and II–94 periods, where the lowest and the highest means of the time series were achieved. The number of direct smears mirrors, approximately, the number of people tested in all the quarters. Although the intervention occurred during 6 of the 12 weeks covering the unit of observation (quarter), it is possible to ascertain an increase in the level of the demand for direct smears and in the number of people tested during the quarter of the campaign. Indeed, the mean was well above the baseline level. It is not possible to observe any trend that can be attributed to the intervention, but there is clearly a very short latency period between the intervention and the effects observed. This was a fact confirmed during monitoring of the campaign’s impact, when the lab staff reported a sudden huge increase in the samples delivered.

For the first two quarters of 1993 the mean of smears and people tested was much higher in the control than in the intervention group. An increase in the number of smears and people tested in the intervention group occurred as a result of adjustments made to the TB programme since 1992 and particularly during 1993. During the following periods both groups performed similarly until the second quarter of 1994. In this quarter the control group kept its trend and level, but the intervention group experienced an increase in mean and level. This period included the 6-week mass media health education campaign. The mean in the intervention group maintained itself above the baseline level until the second quarter after the campaign. During the following quarters the means in the intervention group were higher but mirrored, at least in number of smears, the changes in the mean occurring in the control group.

Table 1. Results of case finding activities in TB control in Cali and Risaralda (1993–95)

<table>
<thead>
<tr>
<th>Yearly quarters</th>
<th>No. of direct smears</th>
<th>No. of people tested</th>
<th>No. of positive TB cases notified</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cali</td>
<td>Risaralda</td>
<td>Cali</td>
</tr>
<tr>
<td>I–93</td>
<td>4348</td>
<td>6256</td>
<td>2077</td>
</tr>
<tr>
<td>II–93</td>
<td>5158</td>
<td>6058</td>
<td>1938</td>
</tr>
<tr>
<td>III–93</td>
<td>6634</td>
<td>6490</td>
<td>3123</td>
</tr>
<tr>
<td>IV–93</td>
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<tr>
<td>IV–94</td>
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<td>4935</td>
<td>2165</td>
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<td>6329</td>
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<td>5394</td>
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</tr>
<tr>
<td>III–95</td>
<td>5416</td>
<td>5167</td>
<td>2275</td>
</tr>
</tbody>
</table>

Source: Report 52-IV of the Tuberculosis Control Programme of the Secretariat of Public Health of Cali, and the Departmental Secretary of Health of Risaralda.
The increase in the demand for direct smears correlates to a peak in the number of cases of pulmonary positive TB notified to the SPHC during the quarter of the media campaign. This peak reached the same level achieved by the TB Control Programme three quarters previously, when a record number of direct smears was performed at the time when the project for improving the performance of the TB control programme gained momentum. Indeed, during the quarter of the campaign there was a 52% increase in notified cases compared with the former quarter.

The increase in pulmonary positive TB cases notified to the SPHC in the quarter of the media campaign is not mirrored by a similar increase in the control group (see Figure 3). In fact, the pattern of notified cases in the control group becomes erratic in the quarters following the campaign.

**Discussion**

Increasing diagnostic coverage is an objective of TB control programmes already achieving high cure rates. Increasing demand for diagnostic smear tests through mass media campaigns is one strategy to achieve this aim. This paper presents the results of an evaluation of the impact on case finding of a mass media health education campaign for TB control carried out in Cali, Colombia.

These evaluation results show a very noticeable and sudden increase in the number of direct smears examined, in the number of people being tested with smears, and in the notification of positive pulmonary TB cases in Cali. These changes coincided with the campaign and occurred only in Cali. The validity of this evaluation is hampered by the lack of a randomized controlled trial in the research design, which was not a feasible option in this case as in most media-based programmes. Thus, threats to the validity of this quasi-experimental evaluation design and of these findings deserve discussion.

Contamination is the validity threat most difficult to control in the evaluation of mass media based interventions. In our case, Risaralda was not reached by Cali’s television and radio broadcasting services at the time of the campaign, but people travelling between these two departments could contaminate the control group. However, this social interchange between people of the two groups – which is mainly concentrated on the border between both departments, 200 km to the north of Cali – is, arguably, too small to alter the results of this evaluation.

Data for this evaluation can be analyzed either by visual inspection or statistical techniques such as ARIMA (Cook and Campbell 1979; Kazdin 1984). The number of observations available for this evaluation, less than 10 observations before and after the campaign, precludes the use of ARIMA, which requires at least 50 observations. Thus, visual inspection is the approach used in the analysis of these data (Kazdin 1984). From this, it is clear that there was a maturation process operating in Cali before the intervention due to the project to improve the performance of the TB control programme (Jaramillo 1995). However, the level of performance stabilized during the three quarters immediately before the campaign. It is important to keep in mind that the effects of seasonal variations are difficult to rule out in short time series
like these. However, it is very improbable that the peak achieved during the quarter of the media campaign could be a result of seasonality effects given that never before did the TB surveillance system report such a level of demand for direct smears. In fact, the amount of tests performed during the quarter of the campaign was similar to the number performed during the whole year in 1990, 1991 and 1992.

Based on these data, and on the fact that there was no other project occurring at that time in either group, it is possible to claim that there is a causal relationship between the mass media health education campaign and the 64% increase in the demand for direct smears in the intervention group. The fact that the intervention was rapidly implemented and that the effects became evident very quickly strengthen the validity of this causal inference. Indeed, the very short latency period between the intervention and the effects observed makes all the more solid the case for attributing causal relationships between the intervention and its effects (Kazdin 1982).

The effect of the intervention on case finding was negatively affected by the relatively low adherence of patients to delivering the three samples requested by the TB control programme. Fortunately between 70–95% of positive cases are diagnosed with the first two smears (unpublished data by the labs in Cali and Risaralda; Harries et al. 1996). In terms of case finding, these results show that, in Cali, for every two TB cases found with direct smears using a passive strategy, there was at least one left undiagnosed within the community. The huge increase in the number of positive cases notified during the campaign quarter compared with the previous quarter reveals the low diagnostic coverage achieved in this setting by a passive case-finding strategy that relies exclusively on the public health system - an issue pointed out recently (Raviglione et al. 1997). However, this is a finding in just one location, Cali, and may not apply elsewhere.

Evaluation of the intervention process (Jaramillo 1998c) suggests that the campaign achieved its impact on case finding thanks to the combination of, at least, three factors:

1. the increase in knowledge about cough as an early symptom of TB;
2. the exposure of at least 49% of the population to the campaign messages;
3. the availability of free diagnostic service in the net of SPHC health care centres.

The campaign delivered two treatments (strategies) simultaneously: one aimed to increase the demand for direct smears, and the other aimed to reduce the levels of prejudice against PWT measured by a social distance scale (Jaramillo 1999a). Multiple-treatment interference (Mertens 1997), which occurs when the effects of one treatment interact in an unknown way with another which is applied simultaneously, is an important threat to external validity in this evaluation. However, it can be argued that, according to previous research findings, the effects of this interaction may not be fundamental in explaining the effects of this campaign on demand for direct smears and TB case finding. Stigma and prejudice are not the main factors determining the interpretation of early TB symptoms in this setting (Jaramillo 1998a; Jaramillo 1999a). If we are to generalize findings of this evaluation to other settings, we can question seriously the capacity of TB control programmes (even those doing well as in Cali) for early diagnosis of new cases and for reducing the infection risk amongst the early close contacts of infectious cases.

From the viewpoint of the programme theory of this campaign one could blame people's ignorance of early TB symptoms for the low diagnostic coverage, but we should also note the operation of other factors. Previous research shows that private clinics were by far the most common choice among those seeking help, not the SPHC health centres (Wolski et al. 1995), and these centres did not always meet the needs of PWT (Jaramillo 1998a). Indeed, in Cali, most of those with chronic respiratory symptoms seek help at private clinics, which tend to miss the diagnosis unless the symptoms are highly suggestive of TB (Wolski 1995; Jaramillo 1998a), a finding reported elsewhere (Uplekar 1993). The fact that people tend to prefer health care providers other than public health centres suggests that the way in which the SPHC works makes it the less attractive option for those seeking help. Finding out how to integrate the activities of TB control programmes into the private health care practice, particularly in the context of the current health care reform being developed in LDCs, is fundamental to strengthen the impact of these programmes.

In spite of the strong immediate effects of the health promotion programme, they were very short-lived, except for the notification of positive cases, which decreased at a much slower pace than the two other indicators. The campaign’s short-lived effects on demand for smears are predictable once Roger’s model for adoption of innovations is taken into account (Roger 1983). According to this theory, a ‘maintenance failure’ occurs when efficacious programmes are successful in terms of delivery and adoption but then lose momentum and dissipate over time (Orlandi et al. 1990). In the case of this campaign, the momentum of the innovation was lost once the delivery of television and radio public services announcements were stopped. This finding reinforces the idea that media campaigns have to be delivered for an unknown longer period of time until the changes in the perception of risk of TB are embedded in the culture of the community. This objective may require the combining of mass media health education with person-to-person strategies to legitimize in the community the new behaviours proposed by media-based messages.

Conclusions

The biomedical strategy for TB control has, quite reasonably, prioritized efforts in the cure of PWT rather than case finding. However, there is a dearth of research about how to increase case finding in those areas where high cure rates have been achieved. This evaluation research begins to fill this gap in two ways: first, by demonstrating that passive case finding relying on public health-care institutions is insufficient to reach the operational targets for diagnostic coverage; and secondly, by demonstrating that the provision of certain information through mass media (early symptoms of TB, costs and
facilities available for diagnosis and treatment) can enable people to demand direct smears and increase case finding.

This report raises several questions for further research. To what extent have those people remaining undiagnosed already sought help in the health care system, and how can this diagnosis delay be reduced? How is it possible to integrate the activities of TB control programmes into the private health care practice? And, how can we promote sustainable behavioural change in the way in which people deal with chronic coughing?

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Biography

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