

## Indirect patient expenses for antituberculosis treatment in Tijuana, Mexico: is treatment really free?

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### Abstract

**Background:** One of the main problems faced by the Mexican National Tuberculosis Program is the high rate of patients abandoning treatment. This study aimed to determine the magnitude of unaccounted costs of tuberculosis (TB) treatment in Tijuana, Mexico.

**Methodology:** Subjects were recruited at 21 health centres. Patients had confirmed active pulmonary TB, had been on treatment for more than 12 weeks, and were aged 18 years and older. The questionnaire provided information about demographics, past and current episodes of TB, and various categories of expenses.

**Results:** The study included 180 patients as follows: 48 had been diagnosed with tuberculosis in the past (26.6%) and had either currently relapsed or failed treatment; 160 (88.8%) were under directly observed therapy (DOT); 131 (72.8%) attended a health centre; and the rest received directly observed treatment at home. The daily cost of transportation to the health centre was MXN  $25.88 \pm 3.22$  (1 USD = 13 MXN). Thirty-two patients (17.8%) had to buy medication at least once, with a monthly medication expense of MXN  $440.5 \pm 40.3$ . Patients receiving DOT at the health centre reported daily food and beverages expenses, spending MXN  $56.5 \pm 10.1$ . Forty-two patients reported laboratory testing expenses, on average MXN  $558.8 \pm 85.8$  per month. Eighty patients (42.4%) reported expenses on radiographic/ultrasound studies, on average MXN  $562.9 \pm 72.1$  per six-month regimen.

**Conclusions** TB diagnosis and treatment posed a significant economic burden on patients in terms of both cost and affordability; clinic-based DOT may contribute disproportionately to the costs incurred by patients.

**Key words:** tuberculosis, treatment, costs, unaccounted

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### Introduction

Globally tuberculosis (TB) causes more deaths among adults than any other single infectious cause of disease [1]. A key to successful tuberculosis control is patient adherence to treatment recommendations. One of the main problems faced by the Mexican National Tuberculosis Program is the high rate of patients abandoning treatment; in 2005, Mexico reported 11,997 new TB cases of which only 77% were cured while under directly observed therapy (DOT) and just 61% in patients under self-administered treatment (SAT) (<http://apps.who.int/globalatlas>).

Many factors have been reported in the literature as contributors for non-adherence to treatment including gender (male), drug abuse, alcoholism, adverse reactions and side effects of the drug regimen, and even the high efficacy of treatment (patients feeling better abandon treatment prematurely) [2]. Although many studies have

addressed the health provider and drug-related costs of tuberculosis, there have been few analyses of the patient-related costs and the impact of unaccounted costs during antituberculosis treatment as a factor for lack of adherence [1].

Although anti-TB treatment is offered for free in Mexico there are several expenses for the patient that are not being taken into account which could have an effect on adherence to treatment. Besides the lost of income as a result of the disability associated with TB, unaccounted expenses include transportation costs, additional medications, laboratory tests, and radiographs expenses among others.

The objective of this cross-sectional study was to determine the magnitude of hidden costs of the tuberculosis treatment in Tijuana, Mexico.

## Materials and methods

Baja California, a Mexican border state with the United States of America, has the highest rate of tuberculosis patients in the country ( $\geq 40 \times 10^5$ ). The city of Tijuana, which shares the international border with San Diego, has a population reported at 1.8 million with a high proportion of transient migrants whose final destination (mostly illegally) is the United States of America.

The subjects for this study were recruited at 21 public primary health care centres in Tijuana. Patients were included if they had confirmed active pulmonary (smear positive) TB, had been on treatment for at least 12 weeks and were aged 18 years or older.

The majority of patients were under a clinic-based DOT strategy (patients are observed by a health care worker or nurse while ingesting their medication at the clinic). A minority of patients were under community-based DOT, where a designated treatment supporter carries out the DOT, or under SAT regimen.

Eligible patients were invited to participate in the study by the TB clinic staff between 1 January 2007 through 31 December 2008. The research assistants explained the study and obtained written informed consent from the patients.

A questionnaire was used for the interview; it contained questions about demographic data, past and current episodes of TB, and various categories of expenses. The study was approved by the ethics committee of ISESALUD de Baja California.

### Data analysis

Data were double entered into a commercial statistics program (SPSS 10.0) for subsequent analysis. Costs were estimated from the moment the study subjects were diagnosed with TB up to the time of interview.

## Results

A total of 180 patients were recruited, of whom 67.2% were males. Median age was 34 years. Median years of education was eight, and 3.9% were illiterate. More than a third (36.9%) did not have any monetary income (unemployed or dedicated to domestic chores) at the moment of diagnosis.

A history of substance abuse was positive in 53.5% of the subjects (Table 1). Ten percent of the patients had been incarcerated in the past.

Ten percent of the patients had a history of diabetes mellitus (non-insulin dependent) for a

median of seven years. Authorization for HIV testing was obtained in 57.4% of the subjects; 7.5% had a positive test.

A total of 48 patients had been diagnosed with tuberculosis in the past (26.6%) and had either currently relapsed or failed the previous treatment regimen. Only 17% of them had been treated under DOT, the vast majority of them (62.5%) at a health centre. Only 58.3% finished the previous treatment and were discharge as cured. Default occurred after a median of 3.5 months.

Patients had been under treatment or retreatment for  $3.55 \pm 2.82$  months (median 3 months) at the time of the interview. One hundred and sixty patients (88.8%) were under daily DOT, 131 (72.8%) of them at a health centre and the rest received DOT at home or were under SAT. Patients under self-administered treatment picked up their treatment at the health centre on a weekly basis in 89.4% of the cases; the rest picked up their treatment every two weeks.

Thirty-eight percent of the patients reported missing a daily dose at least once during the current regimen (mean number of missed doses:  $9.51 \pm 2.94$  days). Forty-two patients (23.3%) had abandoned treatment; when contacted by a health promoter, the most frequent factors mentioned by the patients as the cause of their default were the fear of losing their employment (14.2%), unemployment and lack of income (9.52%), alcoholism, side effects of the TB drugs and cost of transportation to the health centre (7.14% each).

Thirty-two patients (18%) walked to the health centre to receive DOT or pick up their medication. The most common means of transportation to the health centre was by bus (28.7%), fixed route taxi (14.6%) and private car (15.2%). The cost of public transportation per day was MXN  $\$25.88 \pm 3.22$  (median MXN  $\$18$ ; 1 USD = 13 MXN). The roundtrip from the patient's home to the health centre and back took on average  $49 \pm 3.22$  minutes (median 40 minutes), and the waiting time at the health centre was on average  $15 \pm 2.39$  minutes (median 5 minutes).

Thirty-two patients (17.8%) had to buy medication at least once (vitamin B6 or a supplementary anti-TB antibiotic, mostly quinolones). The monthly mean expense on medication was MXN  $\$440.5 \pm 40.3$  (median MXN  $\$99$ ).

Patients receiving DOT at the health centre reported food and beverages expenses, spending on

**Table 1.** History of substance abuse of patients under tuberculosis treatment.

Substance	Frequency	(%)
Any illegal substance	daily	53.5
Methamphetamine	daily	38.5
Marihuana	daily	17.3
Heroin	daily	11.5
Smoking (cigarettes)	10.3 ± 11 a day	44.6
Alcohol	1.38 times/week	50.5

average MXN \$56.5 ± 10.1 (median MXN \$40) daily.

Forty-two patients reported laboratory testing expenses (hemogram, liver function tests, etc.), either at the time of diagnosis or during treatment, on average MXN \$558.8 ± 85.8 (median MXN \$406.5) per month (six month regimen). Eighty patients (42.4%) reported expenses on radiographic/ultrasound studies, also either at the time of diagnosis or during treatment, on average MXN \$562.9 ± 72.1 per six-month regimen (median MXN \$300; table 2).

Twenty-three patients (12.8%) had to be hospitalized; 12 (52.1%) reported expenses that ranged from MXN \$1,000 to MXN \$5,000.

Only 36 patients (20%) reported some work-related income at the time of the interview; 37 patients (20.5%) reported income from family support. The reported weekly income was under MXN \$1,000 (USD \$76.9) in 50.9% of patients earning a salary, and 33.9% reported a weekly salary under MXN \$2,000 (USD \$153.8). Sixty percent of the patients who had a job at the time of diagnosis could not work (and thus lost wages) for three or more months of the six-month regimen. Fifty-five patients receiving DOT at the health centre reported missing or arriving late at work because supervised treatment is offered early in the morning.

An unexpected finding was that some of our patients defaulted because the biggest health centre in the city was located exactly in front of the municipal police headquarters, and they were frequently harassed by the police (10% have been incarcerated in the past and more than 50% were active drug users).

**Discussion**

The overall aim of this study was to estimate the costs of TB diagnosis and treatment from the perspective of the patient, on the largest and most frequently incurred cost items before diagnosis and during treatment. Unfortunately most of the

defaulters in our sample could not be traced and interviewed so the association between magnitude of unaccounted costs and non-adherence to treatment in this particular group could not be explored.

It has been reported that due in part to the organization of TB services, patients incur in a mean total cost representing more than 75% of their average monthly income before their diagnosis [3]. A potential source of bias in our study is that costs reported by patients may have been underestimated due to patients’ failure to recall certain expenditures.

The most striking finding in our survey is the substantial economic burden associated with clinic-based DOT. A community-based DOT strategy could improve patient adherence to treatment while reducing patient costs. Community-based care for TB has already been found to be cost-effective in a number of African settings [4-9].

Several studies found that patients had more pressing issues to attend to in everyday life [10,11], such as taking care of family; patients often explained treatment interruption by noting the costs of treatment [10,12].

**Table 2.** List of most frequent expenses reported by patients under tuberculosis treatment.

Item	Monthly expense (MXN)	Monthly expense (USD)
<b>Transportation</b>	\$ 517.60	\$ 39.81
<b>Food/beverages</b>	\$ 1,130.40	\$ 86.95
<b>Laboratory tests</b>	\$ 558.83	\$ 42.98
<b>x-rays/ultrasound</b>	\$ 93.81	\$ 7.21
<b>non-TB medications</b>	\$ 440.55	\$ 33.88
<b>TOTAL (per month)</b>	<b>\$ 2,741.19</b>	<b>\$ 210.83</b>

In some settings, patients have reported that drugs were expensive [13] and, where treatment itself was free, hidden costs such as hospital stays, X-ray studies, and transportation costs could be high. Sometimes providers acknowledged patients’ financial constraints. However, there are reports of doctors not accepting that costs associated with treatment have caused patients to stop taking treatment because, from the doctors’ perspective, treatment was provided at no cost [10,14].

In rural Uganda and Thailand, patients bear more than 60% of the total burden of tuberculosis costs. Important economic barriers include transportation and food expenses and lost income. These barriers may be reduced through interventions that reduce the

number of health encounters, travel distances, and duration of illness before diagnosis [3].

Several studies indicated that having TB had consequences for work [12,15-18]. Work-related issues included difficulty in obtaining sick leave for treatment and fear of losing work or dismissal [18-20]. These reports showed how some patients prioritized work over taking treatment [12,16-17].

Our results suggest that TB diagnosis and treatment posed a significant economic burden on patients in terms of both cost and affordability. Despite the strengths of the existing TB control strategy promoted by the WHO, we have observed that clinic-based DOT may contribute disproportionately to the costs incurred by patients. To reduce patients' daily expenses in transportation, food and beverages, incurred while under clinic-based DOT, we recommend the creation or strengthening of community-based TB treatment supervision that has proven to be successful in other settings with high TB incidence [21].

The Mexican Seguro Popular project is a government health care initiative with broad political support, which aims to provide social security benefits to underprivileged members of the population (<http://www.seguro-popular.salud.gob.mx>). In place since 2004, it is considered the basis for the wider implementation of social support throughout Mexico. The Seguro Popular program addresses inhabitants who receive no health care benefits by providing them with subsidies for medicine and medical care. We recommend that every patient diagnosed with tuberculosis, who does not have public or private health care benefits, should be included in the Seguro Popular program to obtain access to a total subsidy of the intra-facility costs reported by the patients (drugs, laboratory and radiology).

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**Conflict of Interest:** None is declared