

## Trend of tuberculosis cases under directly observed treatment, short-course strategy in Tabriz, Iran, from 2001 to 2011

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### Abstract

**Introduction:** The universal target under the Millennium Development Goals (MDGs) is to reduce the worldwide burden of tuberculosis (TB) 2015, and we wanted to evaluate development in TB control by assessment of the time trend in incidence and death rate in Tabriz, Iran.

**Methods:** This was a retrospective trend analysis of the data have been recorded in East Azerbaijan State TB center during 10 years. Data were related to patients have been registered for treatment under the directly observed treatment, short-course (DOTS) strategy from 2001 to 2011.

**Results:** In total, 3283 TB patients were treated under DOTS strategy during 2001-2011. Males constituted 55.0% of subjects. The risk was the highest among the productive age group (15-44 years). About 61.0% of cases had pulmonary, and 78.0% of pulmonary TB patients were found to be the sputum smear positive than 46.0% of them were new sputum smear positive, and 2.0% of them were relapse. On average, for sputum smear positive, TB cases from 2005 to 2011; the treatment success rate was 87.3%; the cure rate was 80.2%; the treatment failure rate was 0.5% and death rate was 10.3%. In general, the TB incidence rate for all TB cases was decreased from 11.9-8.1 a 100000 population and the smear-positive pulmonary TB incidence rate were decreased from 4.7 to 4.1 a 100000 population in eastern Azerbaijan province during 2001-2011.

**Conclusion:** In general, we had a decrease in the incidence rate for all of TB cases. In addition, we had a fall in cure rate and had an increase in drug side effects rate in this year that can be because of elevated old people ratio and high death rate by other indirect causes and lack of regular visits and medications taking according to the treatment protocol.

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### Introduction

According to the World Health Organization (WHO), tuberculosis (TB) is among the top 10 causes of death in the world,<sup>1</sup> and based on the report of WHO 2012, it remains a major global health problem with estimated 8.6 million developed TB and 1.3 million deaths

that 320000 were in HIV-positive (human immunodeficiency virus) cases.<sup>2</sup> In 1991, the 44<sup>th</sup> World Health Assembly recognized the enormity of the global epidemic an emergency global public health attributable to earlier neglect of this health problem and setting two global targets for National TB

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Control TB case detection rate of 70.0% and a treatment success of 85.0% among detected cases to be achieved by 2000 and directly observed treatment, short-course (DOTS), was recommended by the WHO globally, for control of TB in 1994 later, the DOTS framework has been developed and implemented in 182 countries.<sup>3</sup>

However, since the current rates of progress are insufficient to achieve the targets of TB control, WHO has expanded a new six-point stop TB strategy (2001-2005).<sup>3,4</sup> The global target under the Millennium Development Goals (MDGs) is to reduce the global burden of TB by 2015 so that the global TB incidence rate should be decreasing and the global TB prevalence and death rates for 1990 should be halving.<sup>5</sup>

From 1995 to 2009, 49 million TB patients were treated in 127 National DOTS programs and 41 million of that patients were treated successfully.<sup>4,5</sup> The global target under the MDGs is to reduce the global burden of TB 2015 so that the global TB incidence rate should be decreasing and the global TB prevalence and death rates for 1990 should be halving.<sup>5</sup>

The case detection rate increased from 46.0 to 63.0% from 1995 to 2009. The treatment success rate among notified cases of smear-positive TB increased from 57.0 to 86.0% from 1995 to 2008.<sup>6</sup> Achieving the MDG, the rate of new TB cases has been decreased globally for about a decade and at the global level by 2012, the TB mortality rate has been declined by 45.0% since 1990 and the target to decrease death by 50.0% by 2015 is within reach (2013, WHO Report).<sup>7</sup>

In Iran, National TB Control Program was integrated with the Network of Health and Treatment System of country in 1990 and DOTS strategy was conducted in 1996 across the country and revised after the presentation of stop TB strategy worldwide.<sup>4</sup>

By 2015, every country should be able to evaluate development in TB control by assessment of the time trend in incidence and the size of reductions in prevalence and deaths.<sup>1</sup>

In Iran, TB mortality (excludes HIV + TB), mortality (HIV + TB only), prevalence (includes HIV + TB), incidence (includes HIV + TB) and incidence (HIV + TB only) rates are 2.9, 0.11, 33.0, 21.0, 0.38 per 100000 population, respectively (WHO, 2012).<sup>8</sup>

Based on a survey in Iran, the incidence rate of smear positive pulmonary TB was reduced during 2001-2008 and on average, annual incidence rate and relapses cases of TB decreased 4.1 and 3.6%, respectively, in the society.<sup>9</sup>

Information on TB cases, particularly treatment outcome of TB, is crucial for planning an effective TB Control Program. The aim of this study was a report of trend and treatment outcome of TB cases and its changing pattern after implementation DOTS Strategy in Tabriz, Iran for 10 years.

## Methods

A retrospective study design was conducted in Tabriz. All TB patients are diagnosed with TB registered and cover with DOTS strategy in TB center is affiliated by the Tabriz University of Medical Sciences.

The source data population of this study was all diagnosed TB cases were registered at this center from 2001 to 2011 and put on DOTS during 10-year period were reviewed. Because DOTS became nationwide in 2001,<sup>9</sup> retrieval of national data was restricted to 2001. We did not exclude cases that data was not completely register thus data missing in that variables were appearing.

Institutional ethical permission was obtained and 10-year retrospective descriptive analysis to assess treatment outcomes and trend of TB patients registered was carried out in DOTS strategy. Data register were all patients with TB were provided with free TB medicine by the DOTS and were followed up regularly until completion of their treatment. we collected with checklist patient's age, sex, home resident (urban/rural), history, category (sputum smear positive/negative), TB (pulmonary/extrapulmonary), drug regimen (side effect), treatment follow-up, follow-up

sputum result (success/failure), and treatment outcomes. Data were entered and analyzed using the SPSS software (version 18, SPSS Inc., Chicago, IL, USA) and Excel (2010 software), and descriptive statistics was used to the description of data were obtained from East Azerbaijan TB center.

### Results

A total of 3283 TB patients, 1809 (55.0%) were females and 1474 (45.0%) males were registered between 2001 and 2011. Overall, among 1873 patients, were registered age information, 2.7% (n = 51) were accounted children ≤ 14 years while the majority of the patients 34.7% (n = 650) were in age group of 15-44 years. 68.0% of the patients were rural residents (1277 from 1874 register cases). Less than 1.0% of patients (n = 19) had prison history. Table 1 shows the general characteristics of the patients.

Total sputum smears positive cases in urban were 48.0% and rural areas 49.0%. 61.0% of cases (n = 1994) had pulmonary TB which 78.0% of pulmonary TB patients (n = 1556) were found to be sputum smear positive, among 1556 pulmonary TB patients, 1498 cases (46.0%) were new sputum smear

positive and 58 cases (2.0%) were relapse. Frequency distribution of all TB cases registered in the Tabriz during 2001-2011 is available in table 2.

**Table 1.** General characteristics of the study subjects registered in the Tabriz during 2001-2011

Characteristics	n (%)
Age group (year)	
0-14	51 (2.7)
15-44	650 (34.7)
45-64	553 (29.6)
≥ 65	220 (33.0)
Unknown	1414
Sex	
Male	1474 (45.0)
Female	1809 (55.0)

The most prevalent type of extrapulmonary TB was the lymph nodes (28.0%), bones (16.0%) and pleural TB (14.0%), respectively. On average, for sputum smear positive TB cases from 2005 to 2011, treatment success rate was 87.3%, the cure rate was 80.2%, treatment failure rate was 0.5% and death rate was 10.3% (Figure 1).

The highest and lowest drug side effects rate were shown in 2011 (6.0%) and 2005 (1.0%), respectively (Figure 2).

**Table 2.** Frequency distribution of all tuberculosis cases registered in the Tabriz during 2001-2011

Year	Total number of TB cases	pulmonary TB	Extra pulmonary TB	Total smear positive cases	new smear-positive	Relapse smear positive	Smear negative
2001	424	252	172	172	167	5	80
2002	371	212	159	165	160	5	47
2003	372	237	135	185	178	7	52
2004	261	162	99	133	131	2	29
2005	273	156	117	120	118	2	36
2006	237	146	91	125	121	4	21
2007	260	153	107	118	111	7	35
2008	264	173	91	128	122	6	45
2009	269	163	106	128	124	4	35
2010	257	164	93	119	115	4	45
2011	295	176	119	163	151	12	13
Total	3283	1994	1289	1556	1498	58	438
percent	100	61	39	47	46	2	13
Percent of pulmonary TB				78	96	4	22

TB: Tuberculosis

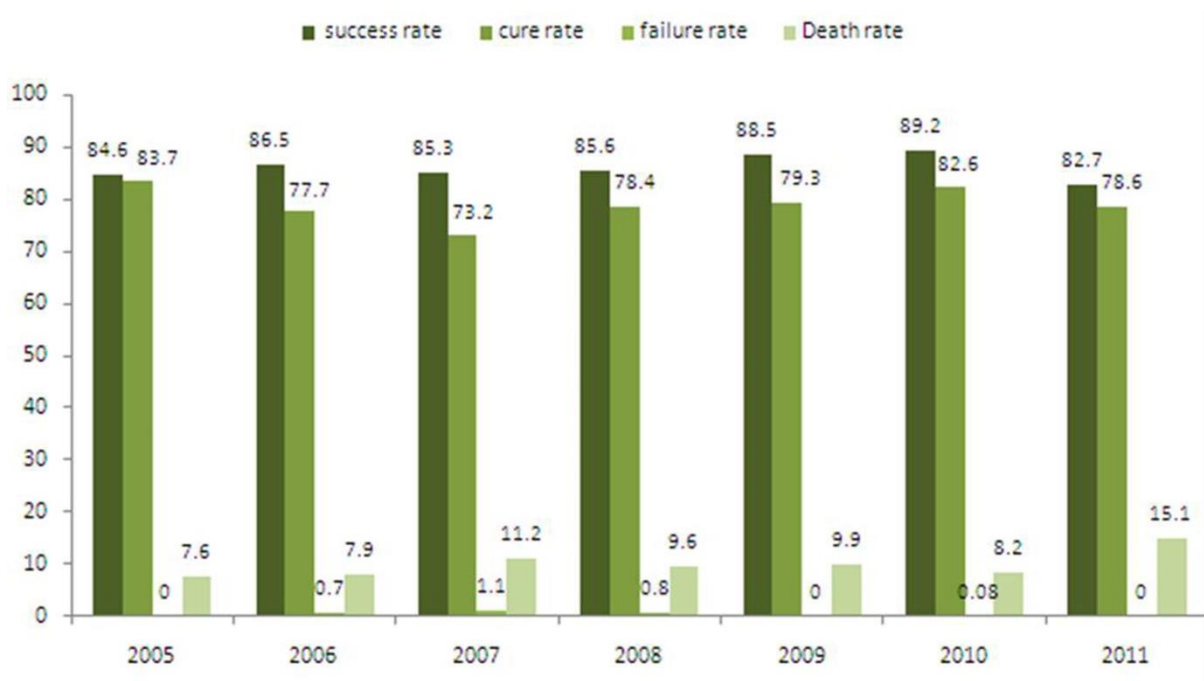


Figure 1. Treatment outcome of total smear-positive cases from 2005 to 2011

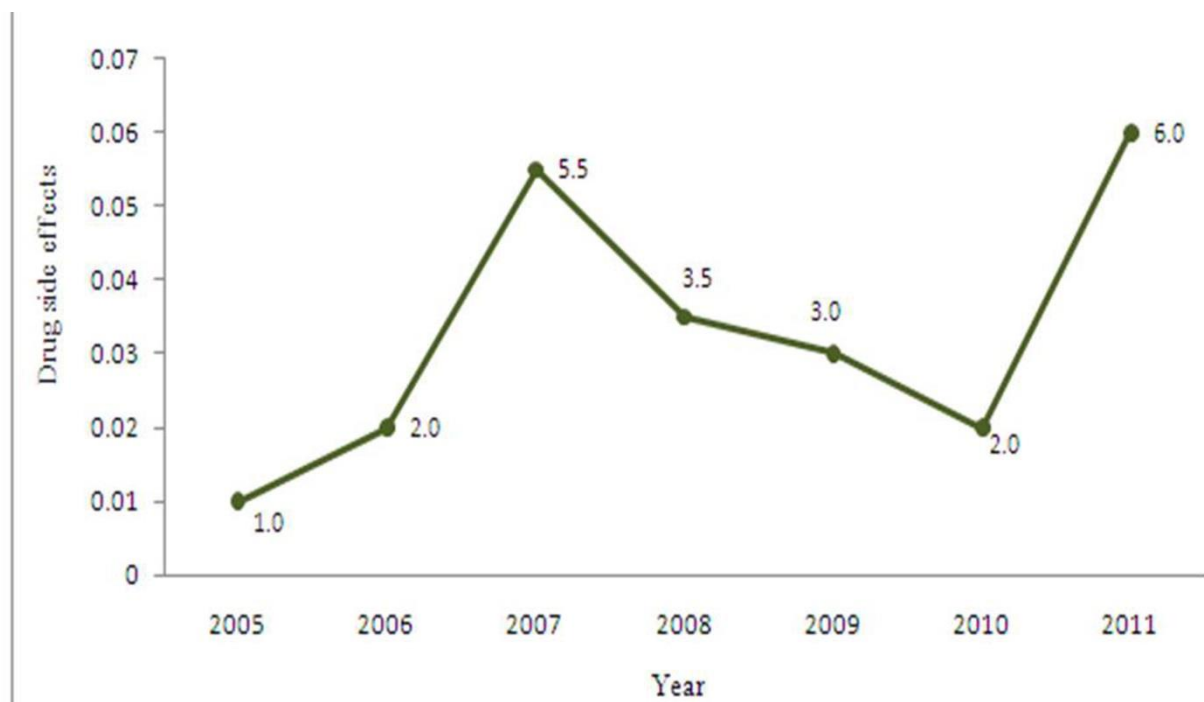


Figure 2. Drug side effects rate to routine cure of tuberculosis (TB) from 2005 to 2011

The incidence of co-infection TB/HIV was 1.5% in 2008 and minimum in 2011 (no case was registered). The incidence of multidrug-resistant (MDR)-TB was 0.05-1.0% per year. However, the MDR-TB cases from Azerbaijan and Nakhchivan, Republic of Azerbaijan, countries referred to Central Reference Laboratory of Tabriz during 2007-2011 were

20-22% for new cases and 45-50% for retreatment. In general, TB incidence rate for all TB cases in Tabriz was decreased from 11.9 (n = 424) to 8.1 (n = 295) per 100000 population during 2001-2011 (Figure 3) and the smear positive pulmonary TB incidence rate was decreased from 4.7 to 4.1 per 100000 population during 2001-2011 (Figure 4).

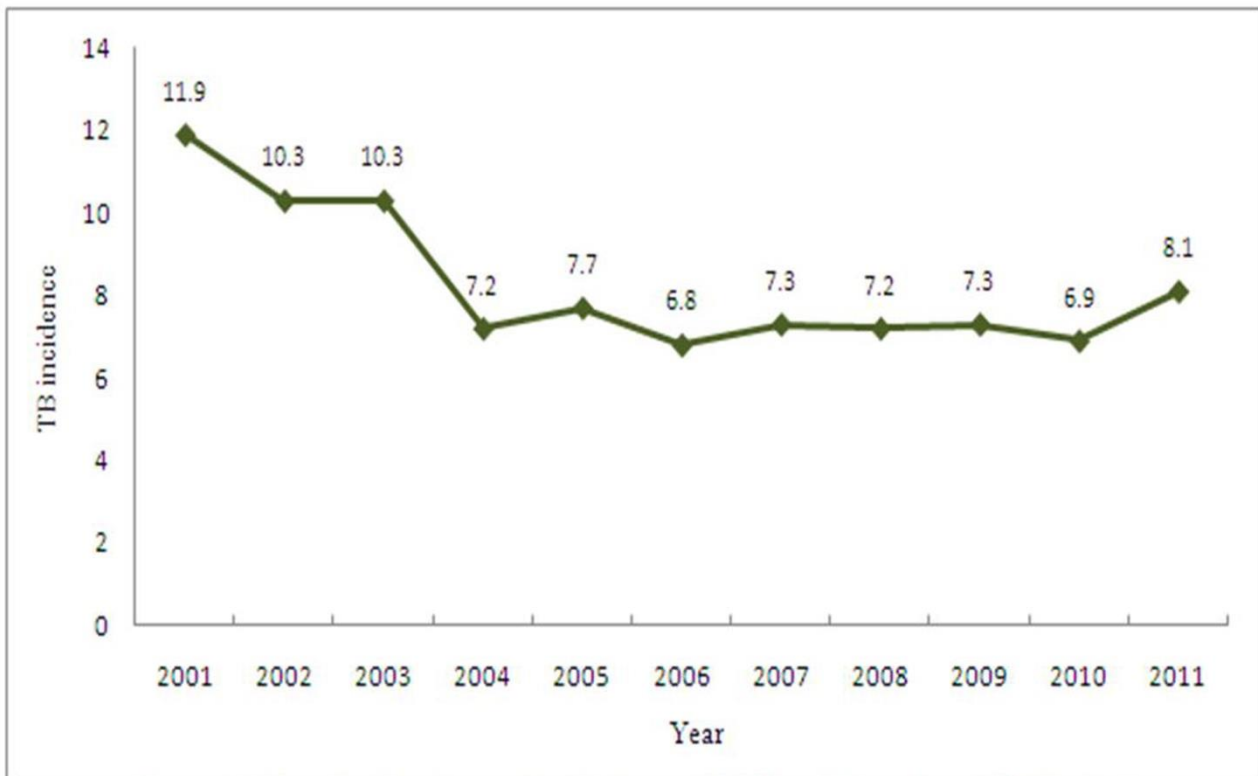


Figure 3. Tuberculosis incidence rate in Tabriz a 100000 populations from 2001 to 2011  
TB: Tuberculosis

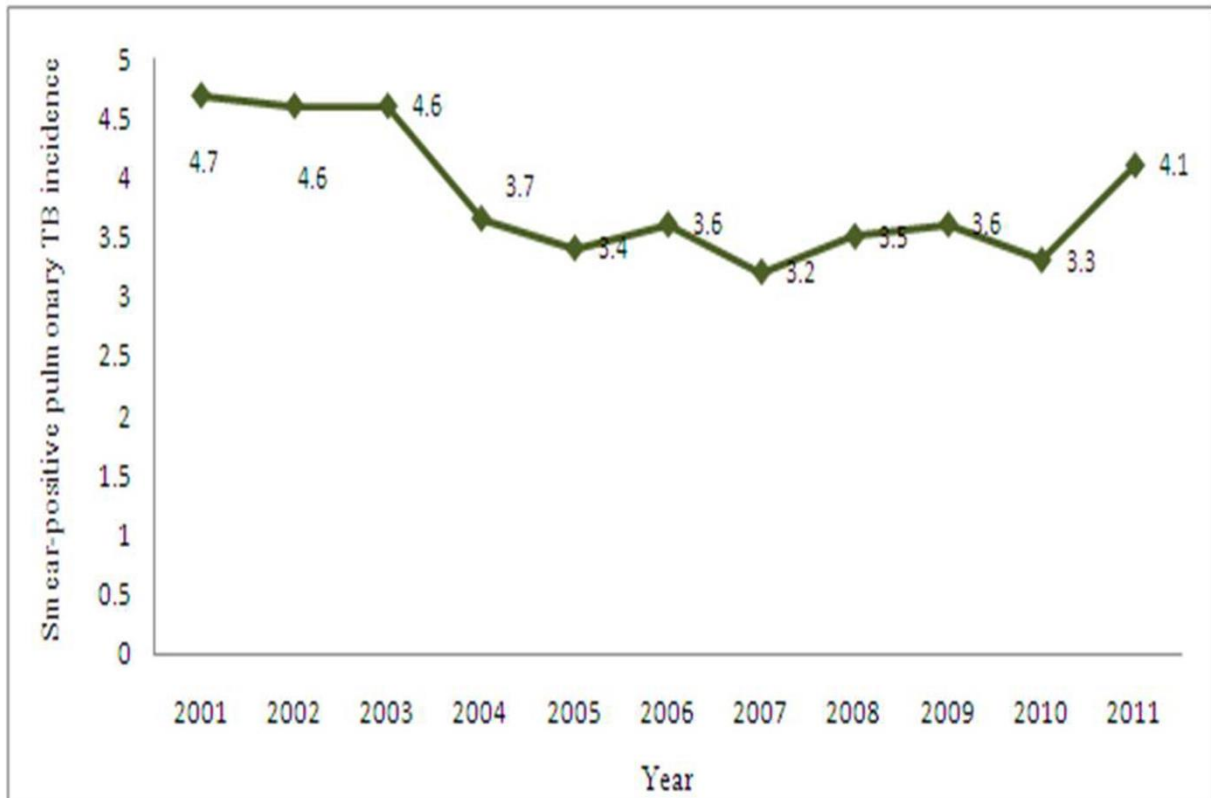


Figure 4. Smear-positive pulmonary tuberculosis incidence rate in Tabriz a 100000 populations from 2001 to 2011  
TB: Tuberculosis

## Discussion

At the present study, the trend of TB incidence decreased from 11.9 to 6.8 per 100000 populations from 2001 to 2006 and had a stable trend during 2006-2010 and increased from 6.9 to 8.1 in 2011. According to National Statistic of TB, these results were compatible with overall incidence rate of TB in the country.<sup>10</sup> The same descending trend were shown from 1963 (142/100000 population) to 2008 (13.8/100000 population) in our country.<sup>11</sup>

At the same time in our research the smear positive pulmonary TB incidence rate was decreased from 4.7 to 4.1 per 100000 populations during 2001-2011 like our study in a systematic review study, smear positive pulmonary TB incidence trend was decreased in Iran.<sup>9</sup> In general the trend of TB incidence decreased during 2001-2011 in our study. Ascending pattern in trend in 2011 attributed to active case detection. The incidence rates for all TB cases and smear-positive cases were the highest in urban areas (68 and 67% respectively)<sup>12</sup> that was like study were conducted in Birjand, Iran.<sup>11</sup>

Living in crowded places in the city, access to health care facilities and high adherence of patients are the possible reasons for maximum incidence rates in the urban region.

Total TB incidence rate in females are higher than males (55.0 vs. 45.0%). Our finding were consistent with National Statistic of TB and studies results of Gonabad (58.0%)<sup>13</sup>, Birjand (57.4%)<sup>11</sup>, Bam (53.6%)<sup>14</sup>, Ilam (54.5%)<sup>15</sup> and Arak (61.9%)<sup>16</sup> cities of Iran.

Staying at home and having long contact with patients, interesting at medical care's and referring to the health center and consequently increasing case detection may be probable reasons for the high ratio in females. Non-governmental system had more important role in case detection and referring patients in comparison with the governmental

system. Regardless people interesting for referring to non-governmental system, this should be surveyed in other studies. National TB Control Program played a significant role in governmental system all over the country. On average, this study gives us valuable information on the sputum smear-positive TB cases, treatment success rate was 87.3%, the cure rate was 80.2%, treatment failure rate was 0.5% and death rate was 10.3% from 2005 to 2011. The minimum level of treatment success is 85.0%<sup>3</sup> that in our province is 87.3% but cure rate was 80.2%. The possibility of this being a high proportion of patients were old age groups that death rate from other indirect causes is high among them result decreased cure rate and high death rate. Irregular visits and lack of or irregular using of medications according to treatment protocol among old patients are other reasons for low cure rate. Limitation of study, as regards the data were obtained from database of state department of health, and some data before 2005 were not recorded, the results cannot be generalized for the entire 10-year period.

## Conclusion

This study shows that incidence rate for all of TB cases decrease 10 years trend to meet the target success rate set by WHO DOTS strategy success should be strengthened to achieve the development goal. Further studies to find unsuccessful cases and outcome to strengthen patient follow-up with sputum examinations are suggested.

## Conflict of Interests

Authors have no conflict of interest.

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