

# Death and defaulted trends among registered TB cases at Jagdalpur TU in Bastar district of Chhattisgarh, India

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## Abstract

**Background:** Tuberculosis (TB) is a foremost global health problem. In 2014, 1.5 million deaths were reported from TB worldwide. In the period of 2010–2014, there was a steady trend of died and defaulted among TB cases with 4% and 6%, respectively, in India. There were few studies regarding trends among died and defaulted in Bastar region and hence the study was planned to assess died and defaulted trends among registered TB patients from the year 2010 to 2014 at TU, Maharani Hospital, Jagdalpur, District Bastar of State Chhattisgarh.

**Aims and Objective:** The present study was conducted with an attempt to assess trends among registered TB cases at Jagdalpur TU in Bastar during 5-year period, i.e., 2010–2014.

**Material and Methods:** It was record based analysis of registered TB cases from year 2010 to 2014, data from TU Jagdalpur, District Bastar, of Chhattisgarh, India, registered from year 2010 to 2014. Collected secondary data were analyzed with the help of STAT/SE 14.1.

**Results:** Overall percentages of died and defaulted among total of 2533 TB patients were 3.7% and 18.7%, respectively. Significant decline was found in died ( $P = 0.004$ ) and defaulted ( $P = 0.000$ ) from 2011 onwards. The mortality was highest in retreatment cases, 7.6%, followed by new smear positive (NSP), 4.9%. New smear negative (NSN) cases had the lowest mortality, 1.4%, and highest default rate, 19.9%. Both death and default rates were 14.8% among the HIV positives.

**Conclusions:** There was significant decline in died and defaulted because of the treatment outcome in total registered TB cases, from year 2010 to 2014. While the death rate was low, the default rate was highest in NSN cases. The mortality was high among HIV-positive TB patients.

**KEY WORDS:** Trend, died, defaulted, tuberculosis, Bastar

## Introduction


Tuberculosis (TB) is a foremost global health problem. In 2014, 9.6 million new TB cases were predicted and 1.5 million deaths were reported from TB worldwide.<sup>[1]</sup> India had around

one-fourth of global TB cases. India and Nigeria accounted for about one-third of global TB deaths.<sup>[1]</sup>

Globally, the TB mortality rate in 2015 was 47% smaller than in 1990: the target of a 50% decrease was almost accomplished with a decreasing trend.<sup>[1]</sup>

To tackle TB burden in India, Revised National Tuberculosis Control Programme (RNTCP) founded on the DOTS (Directly Observed Treatment-Short course) strategy has been made accessible in the entire country in March 2006.<sup>[2]</sup>

Under RNTCP, the death rate and default rate had been showing steady trend of 4% and 6%, respectively, in new smear positive (NSP) cases from 2010 onwards.<sup>[2–5]</sup> But such steady trend of death and defaulted was not observed at state level in Chhattisgarh.<sup>[2–5]</sup> From 2010 onwards, a steady trend

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of 4% death rate was shown up to 2013 and then increased to 5% in 2014 in NSP cases, whereas defaulted in NSP cases had shown declining trend till year 2012 with 8% and 7% in years 2011 and 2012, respectively, with 33% defaulted in the year 2013 followed by a decrease, 5% in the year 2014.<sup>[2-5]</sup> Same was observed among new smear negative cases.<sup>[2-5]</sup>

There were few studies regarding trends among died and defaulted in Bastar region of Chhattisgarh. Keeping this in view the present study was conducted with an attempt to assess trends among registered TB cases at Jagdalpur TU in Bastar during 5-year period, i.e., 2010–2014.

## Material and Methods

The present study was a record based analysis of secondary data collected from TB register of TU Jagdalpur located at Maharani Hospital for 5-year period (2010–2014).

A written permission was obtained from District Tuberculosis Officer, Jagdalpur, for record based study.

Jagdalpur is the district headquarters of Bastar district. Bastar comprises 70% of tribal population. The District Tuberculosis Center, Jagdalpur, Bastar, Chhattisgarh covers approximately 1,413,199 of population. TU Jagdalpur has population of 125,463 of which 63,989 are men while 61,474 are women.<sup>[6]</sup> TU Jagdalpur has 5 Designated Microscopy Centers (DMC) as Maharani Hospital Jagdalpur, DTC Jagdalpur, MPM Jagdalpur, Nangur DMC and Nagarnar DMC.

The TU is usually founded in a Community Health Centre (CHC), DTC, Taluka Hospital (TH) or a Block Primary Health Centre (BPHC). The panel of STS and STLS at the TU level are under the administrative bearing of the DTO and MO-TC. These TUs cover a population of approximately 500,000 (250,000 in tribal, desert, remote, and hilly regions).<sup>[7]</sup>

Definitions of treatment outcomes for new and relapse cases recommended for use since March 2013 and that were used in the 2014 and 2015 rounds of global TB data collection were as follows:

- Died is defined as a TB patient who died from any cause during treatment.
- Lost to follow-up defined as a TB patient who did not start treatment or whose treatment was interrupted for two consecutive months or more.<sup>[1]</sup> (earlier called as defaulted).

**Table 1:** Mortality among tuberculosis patients registered under TU

Year	New smear positive		New Smear Negative		Retreatment cases		Total registered	Total died*, N (%)
	Registered.	Died, N (%)	Registered.	Died, N (%)	Died, N (%)	Died no. (%)		
2010	266	10 (3.8)	394	4 (1.0)	126	10 (7.9)	786	24 (3.1)
2011	93	10 (10.8)	205	5 (2.4)	99	12 (12.1)	397	27 (6.8)
2012	84	3 (3.6)	214	1 (0.5)	88	6 (6.8)	386	10 (2.6)
2013	159	6 (3.8)	215	2 (0.9)	94	4 (4.3)	468	12 (2.6)
2014	157	8 (5.1)	231	6 (2.6)	108	7 (6.5)	496	21 (4.2)
Total	759	37 (4.9)	1259	18 (1.4)	515	39 (7.6)	2533	94 (3.7)

$\chi^2 = 15.02$ ,  $df = 4$ ,  $*P = 0.004$ .

## Limitation

The limitations of the study include the retrospective analysis using routine records which are subject to information bias. Categorization of the patients and their treatment outcomes as mentioned in the records were not independently validated, thus misclassification may not have been identified.

Collected secondary data was analyzed with the help of STAT/SE 14.1.

## Results

Out of 2533 TB patients registered during 2010–2014, men were 1776 (70.1%) and women were 757 (29.9%). Briefly, 900 (35.5%) were in age group less than 30 years and 1633 (64.5%) were having age more than 30 years.

Out of 2533 TB patients registered during 2010–2014, 94 (3.7%) died, death rate was found highest and 6.8% in 2011 and lowest, 2.6% in 2011 and 2014. Significant decline was found in died ( $P = 0.004$ ) from 2011 onwards. For NSP death rate was highest, 10.8% in 2011. Among NSP, NSN and retreatment cases, died decreased from 2011 onwards with increase in 2014 (Table 1).

Highest number of defaulted were seen in NSN, 250 (19.9%) during 2010–2014, followed by retreatment, 137 (26.6%) and NSP, 86 (11.3%). Significant decline was found in defaulted ( $P = 0.000$ ) from 2011 onwards for NSP and NSN cases (Table 2).

It was observed in our study, that the HIV positive percentage was highest among TB patients in 2014, i.e., 14 (2.8%) compared to total average of 1.1%. There was decline in died after year 2011, i.e., 50% in 2011 and 0.0% in 2012 and 2013, but it was 14.3% in 2014. The defaulted decreased from 100% in year 2012 to 7.1% in year 2014.

The linear relationship among died and defaulted in NSN is shown in Figure 1.

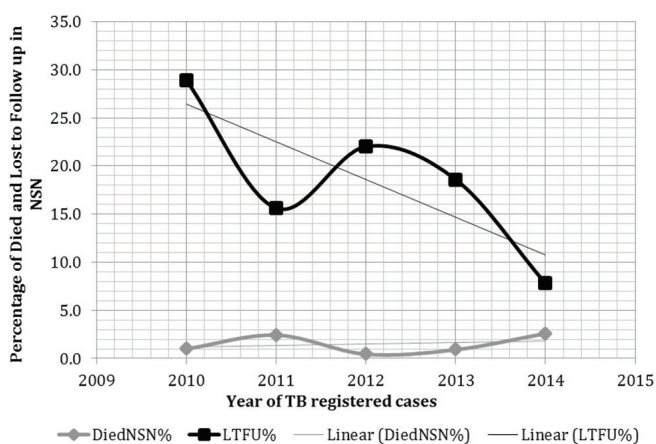
## Discussion

In our study a declining trend of death among NSP from 2011 onwards was observed, which was similar to the findings

**Table 2:** Defaulted among tuberculosis patients registered under TU

Year	New smear positive <sup>†</sup>		New smear negative		Retreatment cases		Total registered	Total defaulted**, N (%)
	Registered	Defaulted, N (%)	Registered	Defaulted, N (%)	Registered	Defaulted, N (%)		
2010	266	51 (19.8)	394	113 (28.9)	126	41 (32.6)	786	205 (26.1)
2011	93	10 (10.8)	205	32 (15.6)	99	23 (23.2)	397	65 (16.4)
2012	84	4 (4.8)	214	47 (22.0)	88	29 (33.0)	386	80 (20.7)
2013	159	8 (5.0)	215	40 (18.6)	94	26 (27.4)	468	74 (15.8)
2014	157	13 (8.3)	231	18 (7.8)	108	18 (16.7)	496	49 (9.9)
Total	759	86 (11.3)	1259	250 (19.9)	515	137 (26.6)	2533	437 (18.7)

$\chi^2 = 58.64$ ,  $df = 4$ ,  $P = 0.000$  \*\*,  $\chi^2 = 27.66$ ,  $df = 4$ ,  $P = 0.000$  †,  $\chi^2 = 43.53$ ,  $df = 4$ ,  $P = 0.000$ .



**Figure 1:** Five year trend of percentage of died and defaulted among NSN. LTF = lost to follow-up (defaulted)

of Dhingra et al<sup>[6]</sup> also he had found decline in default rate in NSP from the year 1999 to 2006, i.e., 10% in 1999 and 5% in 2006.<sup>[6]</sup> It was similar to our study finding; however, the percentage of defaulted in our study was higher than that studied by Dhingra et al<sup>[6]</sup> He had observed decline in died among NSN, i.e., 1.8% in 1999, 1.4% in 2002 but increase in 2006 with 1.9%,<sup>[6]</sup> these findings were consistent with our study. In our study among retreatment cases, there was decline in died from 2012 (12.1%), but in 2014 it was increased to 6.5% similar to the findings of Dhingra et al<sup>[6]</sup> findings with 4.9% died in 2002 and 5.1% in 2006.

Getahun et al, in his study during the period of July 2004–June 2009 among 6450 registered TB patients had observed the died 3.7% which was similar to our study findings however defaulted 5.1% were lower than our study observations.<sup>[9]</sup> He had observed in trend analysis over time between 2004 and 2009 as rise in the rate of death from 2008 onwards however we had observed declining trend from 2011 onwards and it was similar as far as reduction of defaulting rate were concerned.<sup>[9]</sup>

Jappar et al,<sup>[10]</sup> in study of TB trends over a 5-year period of 2006 to 2010 had observed mortality rate of 1.4% due to

TB which was lower than our study finding of 3.7% mortality rate in 5-year period.

As per TB India 2014<sup>[2]</sup> report, among NSP cases, the death rate and default rate has been showing steady trend of 4% and 6%, respectively, for 5-year period from 2008 to 2012. But in our study such steady trend was not observed among NSN cases, the death rate and default rate has been showing steady trend of 3% and 7%, respectively, for 5-year period from 2008 to 2012<sup>[2]</sup> except in 2012 it was 4% for died and 6% for defaulted; in our study no such steady trend was observed. Among retreatment cases, the death rate and default rate has been showing steady trend of 8% and 14%, respectively, for 5-year period from 2008 to 2012,<sup>[2]</sup> but in our study no such steady trend was observed.

WHO defines TB mortality as the number of TB cases dying during the treatment regardless of the cause.<sup>[11]</sup> By this definition the death rate calculation will include patients who die during the course of treatment from causes unrelated to TB from different co-morbidities or even accidents. Besides this will not include the cases who are not registered under the program and are being treated by private set-up. Some of the cases who default from treatment may also die because of TB. Moreover, the patients may die due to TB after their outcome has been recorded in the TB register.

People with active TB can infect 10–15 other people through close contact over the course of a year. Without proper treatment and compliance the disease can spread in the community and will lead to death of around 45% of HIV-negative people with TB and nearly all HIV-positive people with TB.<sup>[11]</sup>

Karanjekar et al<sup>[12]</sup> in his study over period of 2005 to 2007 had found that, defaulters were 18.3% (11/60) and 25% (5/20) among NSP and retreatment, respectively, which was similar for retreatment cases; however, it was higher among NSP than our study findings. Death rate was 5% (1/20) among patients of retreatment cases, however it was higher, 7.6% in our study.

In retrospective analysis by Tessema et al,<sup>[13]</sup> related to treatment outcome of 4000 TB patients who were registered at the hospital; of these, 730 (18.3%) defaulted which was similar to our study finding, however she had found 403 (10.1%) died which was higher than our study. Tessema et al,<sup>[13]</sup>

had observed that the death rate of TB patients was steadily decreased over the study period from 146 (13.9%) in September 2003 to 27 (5.1%) in September 2007. A similar decline in death rate was observed from 2011 onwards.

However, Tessema et al<sup>[13]</sup> found default rate was increased across the years from 97 (9.2%) in September 2003 to 228 (42.9%) in September 2007; however we had found decline from 26.1% in 2010 to 9.9% in 2014

Tefera et al<sup>[14]</sup> in register-based cross-sectional study covering the period of January 2009–December 2013 had found, 102 (8%) and 23 (1.8%) were defaulted and dead and, respectively, however it was lower than our study findings for death and default rates.

Another method of observation may be to calculate excess mortality among TB patients compared to mortality in standard population. In general population, the mortality rate during 2012–2013 was 8.3/1000 for Bastar<sup>[15]</sup> whereas the mortality rate among newly registered TB cases for Bastar region during 2013 was 21/1000, 8/374. Thus, the mortality among TB patients was 2.5 times higher than the mortality rate in general population. Dhingra et al, in his study of mortality trends also found similar results of excess mortality rate of 17.67/1000 population in newly registered TB cases<sup>[8]</sup>.

### Limitation

The limitations of the study include the retrospective analysis using routine records which are subject to information bias. Categorization of the patients and their treatment outcomes as mentioned in the records were not independently validated, thus misclassification may not have been identified.

The RNTCP is on the right path and steadily working toward achieving TB control. The follow-up results of a DOTS regimen in the form of a cohort study for a longer duration are necessary to know the fate of TB patients after DOTS treatment. In future, studies are required to find out reasons for those who did not return for retreatment at DOTS center and evolve methods to ensure their return to treatment.

### Conclusion

There was significant decline in died and defaulted as treatment outcome in total registered TB cases from the year 2010 to 2014. When the death rate was low, the default rate was higher in NSN TB cases. The mortality was high among HIV-positive TB patients.

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