



## SHORT COMMUNICATION

## Effect of increased ART-CPT uptake on tuberculosis outcomes and associated factors, Burundi, 2009–2013

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We retrospectively examined 3579 records of human immunodeficiency virus infected tuberculosis (TB) patients diagnosed from January 2009 to June 2013 in 55 TB treatment facilities in Burundi, to demonstrate whether improvement of combined cotrimoxazole preventive therapy and antiretroviral therapy (ART) uptake was accompanied by improvement of treatment outcomes, and to describe associated factors. Treatment success rates increased from 71% to 80% ( $P < 0.001$ ). While loss to follow-up and transfer-out rates declined significantly, death rates decreased modestly, and remained high, at 14%. ART uptake was worse in suburban areas and private for-profit institutions. World Health Organization targets could be achieved if peripheral health facilities were prioritised.

**B**urundi is a low-income, East African country with a population of 10 million. For the last two decades it has been ravaged by civil war. Since the 1990s, Burundi has had a 1% prevalence rate of human immunodeficiency virus (HIV) infection in adults aged 15–49 years.<sup>1</sup> This has affected the tuberculosis (TB) burden, with notified cases doubling from 3326 per annum in 1995 to 7016 in 2012; in 2013, the national TB incidence rate was 128 per 100 000 population. In 2008, HIV prevalence among newly diagnosed TB patients was 26%.<sup>2</sup> The treatment success rate in new TB patients in 1995 was 45%; 10 years later it had risen to just over 70%.<sup>3</sup>

Cotrimoxazole preventive therapy (CPT) and antiretroviral treatment (ART) are well known to reduce mortality in HIV-positive TB patients and to improve treatment success, with a synergistic benefit when both are taken together.<sup>4,5</sup> The 2004 interim World Health Organization (WHO) TB-HIV policy advocated the use of both treatments singly or together. The 2012 update strongly recommended 100% uptake of CPT and ART in HIV-infected TB patients, both to be started as soon as possible after the initiation of anti-tuberculosis treatment.<sup>6</sup> According to the above WHO recommendations, ART was recommended for all TB-HIV co-infected patients in Burundi in 2012.

Over the last 5 years, there has been a significant increase in the uptake of CPT and ART among HIV-infected TB patients. While the proportion receiving CPT has reached 95%, i.e., near the 100% target, from

the 47% baseline in 2009, those receiving ART reached only 64% in 2013 from a 2009 baseline of 32%, and this component remains a challenge.<sup>3</sup> However, whether the increased access to CPT and ART is accompanied by improved treatment outcomes has not been formally assessed.

The objectives of this study were, among newly diagnosed HIV-infected TB patients, 1) to describe the trends in TB treatment outcomes from 2009 to 2013, and 2) to describe factors associated with ART uptake in 2012–2013.

## ASPECTS OF INTEREST

This retrospective study examined the records of HIV-infected TB patients consecutively registered from January 2009 to June 2013 at 55 randomly selected facilities of the country's total 170 health facilities (health centres, regional and central hospitals) where TB treatment is available. Data were extracted from the TB treatment registers and EpiData software Version 3 was used for entry and Version 2.2.2.183 for analysis (EpiData Association, Odense, Denmark). A descriptive analysis was performed and  $\chi^2$  tests for proportions and for trend and comparison were calculated to show the trend of treatment outcomes over time. Levels of significance were set at 5%.

Ethics approval was obtained from the Ethics Advisory Group of the International Union Against Tuberculosis and Lung Disease, Paris, France, and the Burundi National Ethics Committee. Permission to carry out the study was obtained from the National Tuberculosis Programme (NTP).

There were 3579 HIV-infected TB patients, with a mean age of 39 (IQR 25–54) years. The male:female ratio was 1:1; 50% had pulmonary TB and 92% were newly diagnosed. Three quarters had presented to and were being cared for at regional or central hospitals.

The trends in TB treatment outcomes are shown in the Figure. From 2009 to 2013, treatment success improved from 71% to 80% ( $P < 0.001$ ). Loss to follow-up and transfer out decreased over the same period ( $P < 0.001$  and  $P < 0.05$ , respectively). Death rates decreased modestly, and remained high, at 14%, in 2013.

To examine factors associated with ART uptake, only data from 2012 and 2013 (1264 records) were included, due to the availability of data. ART uptake was worse in suburban areas and private for-profit hospitals (Table).

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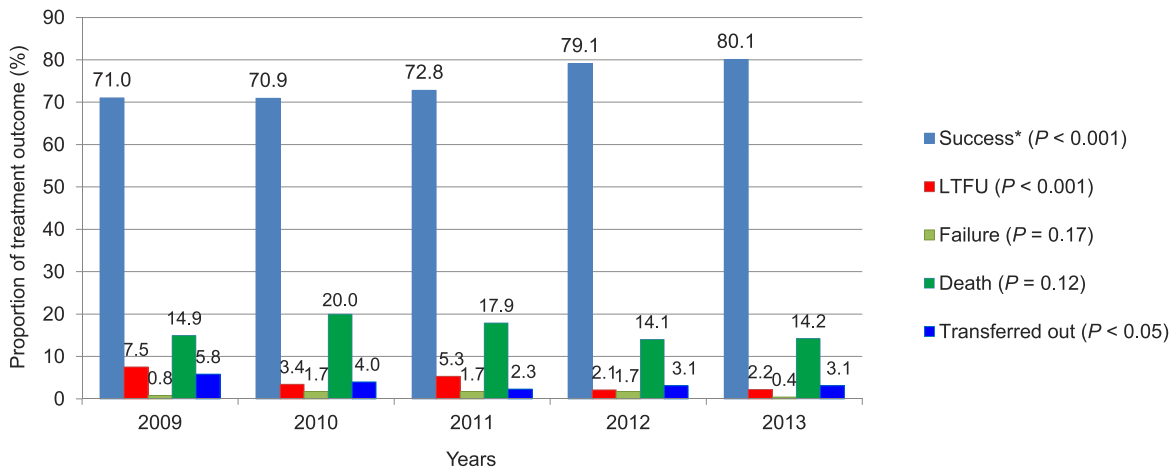
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**FIGURE** Trend of treatment outcomes for all TB patients in Burundi who were HIV-positive, 2009–2013. \*Success = cured or treatment completed. †Data for year 2013 year concerns the 6 months (from 1 January to 30 June) for which treatment outcomes were available. LTFU = lost to follow-up. TB = tuberculosis; HIV = human immunodeficiency virus.

## DISCUSSION

This study showed that the increase in the proportion of HIV-infected TB patients on combined CPT/ART in Burundi in 2009–2013 was accompanied by a significant improvement in NTP treatment outcomes. However, the death rate, while reduced, has remained unacceptably high. ART uptake was worse in suburban areas and private for-profit hospitals.

The strengths of this study are that programme-level data were used and that it included a large number of health facilities. Limitations relate to the difficulties of record review and the lack of some HIV-related data in TB registers. In addition, many peripheral health facilities were not visited due to security issues, resulting in a bias towards central urban facilities with better access and follow-up. We did not investigate the reasons for the continued high death rate, as this was beyond the scope of the study. Finally, we were unable to document the times when ART and CPT were started, and this may have a significant effect on TB case fatality. We were also unable to investigate a causal association between the increase in CPT-ART and TB outcomes. In addition, the relationship between CPT-ART increase and TB outcomes was only demonstrated for 2 years.

Treatment outcomes in this study were similar to those in Uganda, where the integration of TB and HIV care led to improved TB treatment outcomes and earlier ART initiation.<sup>7</sup> Such results support the rollout of a fully integrated TB-HIV service delivery model throughout high-prevalence TB and HIV settings.

Although the death rate among TB patients decreased modestly between 2010 and 2013, it remained high, at 14%. Addressing diagnostic delays and initiating ART soon after starting anti-tuberculosis treatment may be ways forward.<sup>8</sup> The causes of death also need to be examined more closely, as well as the effect of increased CPT-ART uptake on reductions in loss to follow-up and transfer-out.

In a rural district in Malawi, ART uptake among TB patients was low and associated with the costs of transport to a centralised hospital site providing ART.<sup>9</sup> Our

**TABLE** Factors associated with ART uptake among HIV-positive TB patients in Burundi, January 2012–June 2013

Category	ART uptake <i>n</i> (%)	<i>P</i> value
Age group, years ( <i>n</i> = 1264)		
1–14	38 (83)	0.19
15–24	94 (73)	
25–54	753 (78)	
≥55	87 (71)	
Sex ( <i>n</i> = 1263)		
Male	551 (77)	0.81
Female	420 (77)	
Type of TB ( <i>n</i> = 1264)		
PTB	497 (77)	0.81
EPTB	475 (76)	
Site of TB ( <i>n</i> = 1264)		
Pulmonary	497 (77)	0.65
Pleural	107 (79)	
Pericardial	33 (75)	
Peritoneal	30 (75)	
Meningeal	36 (78)	
Lymph and node	42 (78)	
Bones and joints	30 (86)	
Genitourinary	8 (89)	
Miliary or disseminated	94 (78)	
Not recorded	95 (70)	
Health service attendance ( <i>n</i> = 1264)		
Public	875 (77)	<0.0001
Private not-for-profit	79 (86)	
Private for-profit	18 (49)	
Availability of ART at the same HC ( <i>n</i> = 1264)		
ART not available	8 (79)	0.58
ART available	889 (77)	
Examinee's residence ( <i>n</i> = 1263)		
Rural area	216 (79)	<0.0001
Suburban area	51 (54)	
Urban area	704 (79)	

ART = antiretroviral treatment; HIV = human immunodeficiency virus; TB = tuberculosis; PTB = pulmonary TB; EPTB = extra-pulmonary TB; HC = health centre.

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study demonstrates the need to decentralise ART from central to peripheral facilities closer to the patients' homes as an essential step towards better coverage, with more attention paid to suburban areas, where poverty, unemployment and overcrowding are sources of inequality. Future research should incorporate qualitative research methods to assess precise reasons for not receiving ART.

In conclusion, this study showed that the improvement in ART and CPT uptake was accompanied by the improvement of TB treatment outcomes in Burundi. With more efforts to decentralise care, the WHO targets may be achieved. New approaches may be required to address the unacceptably high death rates.

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Une étude rétrospective conduite de janvier 2009 à juin 2013 au Burundi chez 3579 patients co-infectés par la tuberculose (TB) et le virus de l'immunodéficience humaine dans 55 centres de diagnostic et de traitement de la TB, décrit l'évolution des résultats de traitement antirétroviral (ART) et cotrimoxazole et apprécie les facteurs liés à l'ART. La proportion des succès au traitement a augmenté de 71% à 80% ( $P < 0,001$ ). Tandis que les taux de perdus

de vue et de transferts ont baissé significativement, celui des décès n'a baissé que modestement, tout en restant élevée, à 14%. La couverture en ART est plus faible dans les centres de santé périphériques et dans ceux relevant du privé non lucratif. Les objectifs de l'Organisation Mondiale de la Santé pourraient être atteints si les districts sanitaires ruraux étaient inclus dans la fourniture des soins.

En el presente estudio se analizaron 3579 registros de pacientes aquejados de coinfección por el virus de la inmunodeficiencia humana (VIH) y la tuberculosis (TB) en Burundi de enero del 2009 a junio del 2013, provenientes de 55 establecimientos de tratamiento de la TB, con el objeto de investigar si al aumentar la aceptación del tratamiento preventivo con cotrimoxazol en asociación con el tratamiento antirretrovírico (ART) se mejoraban los desenlaces terapéuticos y también se describieron los factores que se asociaban con esta situación. Las tasas de éxito terapéutico

augmentaron de un 71% a un 80% ( $P < 0,001$ ). Aunque las tasas de pérdida durante el seguimiento y de remisión a otros establecimientos disminuyeron de manera significativa, la disminución de las tasas de mortalidad fue leve y permanecieron en un nivel alto de 14%. La aceptación del ART fue más deficiente en las zonas suburbanas y en los establecimientos privados con ánimo de lucro. Sería posible cumplir con las metas de la Organización Mundial de la Salud si se da prioridad a los establecimientos sanitarios periféricos.