



Predictors of Non-Uptake of Human Immunodeficiency Virus Testing by Tuberculosis Public Primary Patients in Three Districts, South Africa

***K Peltzer^{1,2}, G Mchunu¹, B Tutshana¹, P Naidoo^{1,3}, G Matseke¹, J Louw¹**

1. *HIV/STI and TB (HAST) Research Programme, Human Sciences Research Council, Pretoria, Durban and Cape Town, South Africa*
2. *Dept. of Psychology, University of Limpopo, Turfloop, South Africa, 3Department of Psychology, University of the Western Cape, Cape Town, South Africa*

***Corresponding Author:** Email: kpeltzer@hsrc.ac.za

(Received 11 Feb 2012; accepted 12 Sep 2012)

Abstract

Background: The acceptance of HIV testing among patients with tuberculosis (TB) is low in South Africa. The aim of this study was to assess the prevalence, associated factors and reasons of non-uptake of human immunodeficiency virus (HIV) testing by tuberculosis public primary care patients in three districts, South Africa.

Methods: In May-October 2011, this cross-sectional survey was conducted amongst 4726 TB patients across 42 primary health care facilities in three districts in South Africa. All new TB and new retreatment patients (N=4726) were consecutively interviewed within one month of anti-tuberculosis treatment. The outcome was self-reported HIV testing after TB diagnosis, validated using clinic registers.

Results: Almost one in ten (9.6%) of the 4726 participants had not undergone HIV testing, with the most often offered explanation being that they were not knowing where to get tested (21.3%), followed by believing not to have or at risk for HIV (24.3%), emotional concerns (not ready for test: 13.2%; afraid to get to know: 12.1%; concerns over confidentiality: 6.3%) and concerns about stigma (3.3%) and losing the job (2.0%). In multivariable analysis being male, severe psychological distress, having sex with someone HIV negative or unknown and frequency of sex without a condom were associated with not having been tested for HIV.

Conclusions: The level of HIV testing among TB public primary care patients was suboptimal, as per policy all patients should be tested. The South African Department of Health should continue to scale-up HIV testing and other collaborative TB-HIV services at health facilities.

Keywords: HIV testing, Predictors, Tuberculosis patients, South Africa

Introduction

South Africa has 0.7% of the world's population, and 28% of the world's population of HIV and TB co-infected individuals (1). It has been estimated that there is approximately 60% of people with TB who are co-infected with HIV (2). Co-infected patients have almost double the chances of getting MDR-TB as well as XDR-TB. These patients also have a high mortality rate due

to co-infection with HIV (3). HIV testing among TB patients provides access to the package of HIV treatment and care. The World Health Organization (4) has recently recommended routine HIV counselling and testing of all TB suspects. In South Africa, provider-initiated HIV counselling and testing has been integrated into the TB management strategy (3). According to the

South African national tuberculosis management guidelines, TB clients should be strongly advised to have an HIV test; ideally the offer of an HIV test should take place soon after initiation of TB treatment, as the morbidity and mortality of co-infected patients are the highest in the first two months of treatment (1). Previous studies in South Africa found that almost one third (32.5%) of tuberculosis (TB) patients reported that they had not undertaken HIV testing (5), in Ethiopia 29.4% (6) and even a lower uptake of HIV testing among TB patients was found in other studies (59%-65%) (7,8). A range of patient-level factors have been found to be associated with TB patients' non-uptake of HIV testing, including male sex (9), older age (8), lower education (6), being unemployed (7), employed (9), new treatment for TB (9), HIV risk behaviour (unprotected sex) (9), fear of stigmatization (6,10), fears of testing HIV-positive and death (5,11), perceived lack of confidentiality of HIV test results (8,10) and lack of knowledge about HIV counselling and testing procedures (7,8).

The aim of this study was to assess the prevalence, associated factors and reasons of non-uptake of human immunodeficiency virus (HIV) testing by tuberculosis public primary care patients in three districts, South Africa.

Materials and Methods

Sample and procedure

Three provinces, in South Africa, with the highest TB caseload were selected for inclusion in the study. One district in each province (N = 3) with the highest TB caseloads were ultimately included. These districts were Siyanda in Northern Cape Province, Nelson Mandela Metro in the Eastern Cape Province, and EThekweni in KwaZulu-Natal Province. Within each of these three study districts 14 primary health care facilities were selected on the basis of the highest TB caseloads per clinic (N = 42). The type of health facilities were primary health care clinics or community health centres. All new TB and new retreatment patients were consecutively interviewed within

one month of anti-tuberculosis treatment. The interview was conducted by trained external research assistants for a period of 6 months in all 42 clinics. A health care provider who identified a new TB treatment or retreatment patient (within one month of treatment) and 18 years and above informed the patient about the study and referred the patient for participation if interested. A research assistant asked for permission/consent from patients attending the primary care facility to participate in the screening interview.

We have received ethical approval from the Human Sciences Research Council Research Ethics Committee (Protocol REC No.1/16/02/11). The Department of Health in South Africa has also provided approval for this study.

Measure

A researcher-designed questionnaire was used to record information on participants' age, gender, educational level, marital status, income, employment status, dwelling characteristics and residential status. Poverty was assessed with 5 items on the availability or non-availability of shelter, fuel or electricity, clean water, food and cash income in the past week. Response options ranged from 1="Not one day" to 4="Every day of the week". Poverty was defined as higher scores on non-availability of essential items. The total score ranged from 5 to 20, 5=being low, 6-12= medium and 13-20=high poverty. Cronbach alpha for this poverty index was 0.89 in this sample.

TB treatment status and HIV status were assessed by self-report and from medical information. Those who got tested for HIV were asked for reasons to get tested and those who had not been tested were asked for reasons of not having been tested for HIV.

Participants were asked, in general, would you say your health is: excellent, very good, good, fair or poor? This measure was categorized based on participant response (very good = excellent/very good, good, and poor = fair/poor).

The 10-item Alcohol Disorder Identification Test (AUDIT) (12) assessed the alcohol consumption

level (3 items), symptoms of alcohol dependence (3 items), and problems associated with alcohol use (4 items). Responses to items in the AUDIT were rated on a 4-point Likert scale from 0 to 4, for a maximum score of 40 points. Higher AUDIT scores indicate more severe levels of risk; scores 8 indicate a tendency to problematic drinking (hazardous or harmful drinking) (12). Cronbach alpha for the AUDIT in this sample was 0.92, indicating excellent reliability.

Two questions were asked about the use of tobacco products. 1) Do you currently use one or more of the following tobacco products (cigarettes, snuff, chewing tobacco, cigars, etc.)? Response options were “yes” or “no”. 2). In the past month, how often have you used one or more of the following tobacco products (cigarettes, snuff, chewing tobacco, cigars, etc.)? Response options were once or twice, weekly, almost daily and daily.

The Kessler Psychological Distress Scale (K-10) was used to measure global psychological distress, including significant pathology which does not meet formal criteria for a psychiatric illness (13,14). This scale measures the following symptoms over the preceding 30 days by asking: “In the past 30 days, how often did you feel: nervous; so nervous that nothing could calm you down; hopeless; restless or fidgety; so restless that you could not sit still; depressed; that everything was an effort; so sad that nothing could cheer you up; worthless; tired out for no good reason?” The frequency with which each of these items was experienced was recorded using a five-point Likert scale

ranging from “none of the time” to “all the time”. This score was then summed with increasing scores reflecting an increasing degree of psychological distress. We examined the K-10 scale using as a binary variable comparing scores of 0-29 versus 30 or more (13,14). The internal reliability coefficient for the K-10 in this study was alpha = 0.92.

HIV risk behaviour was assessed with the following items: sexually active in the past 3 months, unprotected last sex, the number sex occasions with condom use in the past 3 months, the number of sex occasions without condom use in the past 3 months, and HIV status of a sexual partner.

Results

Sample characteristics

Of the total sample (N=4935), 35 (0.7%) refused to participate, so the final sample included 4900, 54.5% men and 45.5% women, with a mean age of 36.2 years (SD=11.5), range 18 to 93 years. Almost two-thirds of the participants (65.2%) were between 25 to 44 years old, the majority (72.7%) was never married, 27.7% had completed secondary education, 17% scored high on the poverty index, and only 24.2% had as a main household income a formal salary. Participants' characteristics stratified by HIV test uptake are presented in Table 1. Almost one in ten (9.6%) of the 4726 participants had not undergone HIV testing.

Table 1: Sample characteristics of TB patients in three different districts in South Africa

	Tested for HIV (n=4273, 90.4%) n (%) ¹	Not tested for HIV (n=453; 9.6%) n (%) ¹
Age (N=4837; 63 missing)		
18-24	561 (90.5)	59 (9.5)
25-34	1643 (92.4)	136 (7.6)
35-44	1148 (90.1)	126 (9.9)
45or more	873 (87.5)	125 (12.5)
Gender (N=4825, 75 missing)		
Male	2227 (87.7)	311 (12.3)
Female	1981 (93.5)	138 (6.5)

Table 1: Cond...

<i>Marital status</i> (N=4632, 268 missing)		
Not married	2954 (91.0)	291 (9.0)
Married/cohabitating	881 (90.5)	92 (9.5)
Separated/divorced/widowed	233 (86.0)	38 (14.0)
<i>Education</i> (N=4818, 82 missing)		
Grade 7 or less	1091 (88.9)	136 (11.1)
Grade 8-11	3004 (90.9)	299 (9.1)
Grade 12 or more	124 (89.9)	14 (10.1)
<i>Poverty index</i> (N=4620, 280 missing)		
Low	1447 (91.8)	130 (8.2)
Medium	1972 (90.4)	209 (9.6)
High	637 (87.0)	95 (13.0)
<i>Residence</i> (N=4827, 73 missing)		
Urban	2786 (89.5)	327 (10.5)
Rural	793 (93.7)	53 (6.3)
Informal settlement	649 (90.1)	71 (9.9)
<i>Perceived health status</i> (N=4833, 67 missing)		
Excellent/very good	764 (87.0)	114 (13.0)
Good	1483 (91.1)	144 (8.9)
Fair/poor	1997 (91.5)	186 (8.5)
<i>TB treatment status</i> (N=4835, 65 missing)		
New TB	1009 (92.0)	363 (10.1)
Retreatment	3228 (89.9)	88 (8.0)
<i>Current tobacco use</i> (N=4735, 165 missing)		
Yes	1097 (87.4)	158 (12.6)
No	3064 (91.7)	278 (8.3)
<i>Hazardous or harmful alcohol use</i> (N=4808, 92 missing)		
Yes	984 (88.6)	122 (11.4)
No	3271 (91.0)	325 (9.0)
<i>Severe psychological distress</i> (N=4845, 55 missing)		
Yes	1017 (88.1)	138 (11.9)
No	2988 (91.3)	283 (8.7)
<i>Sexually active in the past 3 months</i> (N=4585, 315 missing)		
Yes	2013 (88.8)	255 (11.2)
No	2018 (62.1)	174 (7.9)
<i>Last sexual partner</i> (N=4453, 447 missing)		
HIV negative or unknown	2754 (87.3)	402 (12.7)
HIV positive	1168 (98.9)	13 (1.1)
<i>Sex without condom use occasions (past 3 months)</i> (N=2632)		
0-2 times	1387 (90.9)	139 (9.1)
3-20	607 (86.7)	93 (13.3)
21-41+ times	257 (81.6)	58 (18.4)
<i>Sex with condom use occasions (past 3 months)</i> (N=2623)		
0-2 times	1059 (87.0)	158 (13.0)
3-20	725 (90.0)	81 (10.0)
21-41+ times	461 (90.0)	51 (10.0)
<i>Unprotected last sex</i> (N=4287, 613 missing)		
Yes	2140 (93.4)	152 (6.6)
No	1660 (88.0)	226 (12.0)

¹N do not add up to the total due to missing values

HIV testing characteristics

Those who got tested for HIV gave as major reasons to get tested “I was feeling sick” (50.6%) and “I wanted to know my HIV status” (33%) (Table 2). Most had been tested in a public health facility (clinic or doctor 68.3% and hospital 20.5%), followed by private health facility (hospital 4.8% and private clinic or doctor 3.5%), HIV testing centre 2.0%, youth centre or loveLife clinic 0.5% and in the workplace 0.2%. The most recent HIV test had been for most (76.3%) less a year ago, 11.2% between one to two years ago and 12.4% two or more years ago.

Major reasons not to get tested for HIV was not knowing where to get tested (21.3%), followed by believing not to have or at risk for HIV (24.3%), emotional concerns (not ready for the test: 13.2%; afraid to get to know: 12.1%; concerns over confidentiality: 6.3%) and concerns about stigma (3.3%) and losing the job (2.0%) (Table 3). The majority (77.0%) indicated that they wanted to know their HIV status, 8% were unsure and 15% did not want to know if they were HIV positive or negative.

Predictors of not testing for HIV

Univariate analyses found that being male, being separated, divorced or widowed, high poverty, urban residence, excellent or very health status, being on TB retreatment, substance use (alcohol, tobacco), severe psychological distress and being sexually active (without a condom) were associated with “Not tested for HIV”, while in multivariable analysis being male, severe psychological distress, having sex with someone HIV negative or unknown and frequency of sex without a condom were retained in the analysis (Table 4).

Table 2: Main reason for going for your most recent HIV test of TB patients

	n	%
I was feeling sick	2214	50.6
I wanted to know my HIV status	1444	33.0
I was instructed by a health worker (nurse/doctor)	292	6.7
I was pregnant	146	3.3
My partner asked me to go for testing	118	2.7
My employer requested it	63	1.4
I wanted to start a new sexual relationship	41	.9
Workplace campaign	18	.4
I wanted to get married	14	.3
Other	12	.3
I applied for a loan	7	.2
I applied for an insurance policy	6	.1

Table 3: Main reason for not going for an HIV test of TB patients

	n	%
I do not know where to get tested	118	21.3
I do not think that I have HIV	90	16.3
I am not ready to have an HIV test	73	13.2
I was afraid to find out that I might be HIV positive	67	12.1
I trust my partner	59	10.7
I am not at risk for HIV	44	8.0
I was concerned about confidentiality	35	6.3
I haven't got around to it	20	3.6
I was concerned about stigma, discrimination or rejection	18	3.3
Other	13	2.4
I was concerned about losing my job	11	2.0
I am concerned about the standard of service	5	.9

Table 4: Predictors of not tested for HIV of TB patients in three different districts in South Africa

	Crude OR (95% CI) ^a	Adjusted OR (95% CI) ^{a,b}
Age		
18-24	1.00	---
25-34	0.79 (0.57-1.08)	
35-44	1.04 (0.75-1.45)	
45or more	1.36 (0.98-1.89)	

Table 4: Cond...

Gender		
Female	1.00	1.00
Male	2.01 (1.63-2.47)***	1.96 (1.39-2.75)***
Marital status		
Not married	1.00	1.00
Married/cohabitating	1.06 (0.83-1.36)	0.87 (0.60-1.26)
Separated/divorced/widowed	1.66 (1.15-2.38)**	1.63 (0.84-3.14)
Education		
Grade 7 or less	1.00	1.00
Grade 8-11	0.80 (0.64-0.99)*	1.11 (0.75-1.64)
Grade 12 or more	0.91 (0.51-1.62)	1.35 (0.61-3.02)
Poverty index		
Low	1.00	1.00
Medium	1.18 (0.94-1.48)	1.13 (0.79-1.62)
High	1.66 (1.25-2.20)***	1.44 (0.91-2.26)
Residence		
Urban	1.00	1.00
Rural	0.60 (0.42-0.77)***	0.79 (0.50-1.32)
Informal settlement	0.93 (0.71-1.22)	0.85 (0.50-1.32)
Perceived health status		
Excellent/very good	1.00	1.00
Good	0.65 (0.50-0.85)***	0.78 (0.53-1.15)
Fair/poor	0.62 (0.49-0.80)***	0.88 (0.60-1.29)
TB treatment status		
New TB	1.00	1.00
Retreatment	1.29 (1.01-1.65)*	0.97 (0.67-1.40)
Substance use		
Current tobacco use	1.59 (1.29-1.95)***	1.04 (0.74-1.47)
Hazardous or harmful alcohol use	1.30 (1.04-1.61)*	0.94 (0.66-1.35)
Severe psychological distress	1.43 (1.16-1.78)***	1.40 (1.00-1.95)*
Sexual (risk) behaviour		
Sexually active in the past 3 months	1.47 (1.20-1.80)***	1.48 (0.79-2.77)
Sex without condom use occasions	1.14 (1.08-1.21)***	1.14 (1.07-1.22)***
Last sexual partner		
HIV positive	1.00	1.00
HIV negative or unknown	13.12 (7.52-22.88)***	16.96 (6.90-41.65)***

^a Using “enter” LR selection of variables

^b For Hosmer and Lemeshow Chi-square 16.17, df 8, 0.040; Cox and Snell R² 0.08; Nagelkerke R² 0.16

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$

Discussion

The study found among a large sample of tuberculosis public primary care patients that 9.6% had not tested for HIV within one month of TB treatment. This rate seems better than found in previous other studies in South Africa and elsewhere in Africa (5,7,8,15,16). Yet, there could be still improved uptake of HIV testing among TB public primary care patients in South Africa.

The study found that major reasons not to get tested for HIV was not knowing where to get tested, believing not to have or at risk for HIV, emotional concerns (not ready for the test, afraid to get to know, concerns over confidentiality) and concerns about stigma. Similar reasons for the non-uptake of HIV testing in TB patients were found in other studies including low HIV risk perception (5,10,17,18), which should be addressed in HIV education. Health workers

should engage with patients about their fear of HIV-positivity, TB-HIV coinfection, emotional concerns and stigma. TB patients should also be informed of the preventive and prognostic advantages of early HIV/AIDS diagnosis (19,20). In multivariable analysis being male, severe psychological distress and HIV risk behaviour were found to be associated with non-uptake of HIV testing. Being male and HIV risk behaviour were also found to be associated with non-uptake of HIV testing in other studies (9). There is concern that HIV risk behaviour was associated with non-uptake of HIV testing, both should be addressed in interventions, in particular in men. Identification and management of TB patients with severe psychological stress in primary care may also help to increase the uptake of HIV testing in this group. Undergoing retreatment for TB was in this study in univariate analysis associated with non-uptake of HIV testing, which was also found in a study in Indonesia (21) and a study in South Africa (9) found the opposite that being a TB retreatment patient was associated with uptake of HIV testing. This may mean that retreatment TB patients could be more targeted for HIV testing strategies. Unlike in other studies older age (8) and lower education (6) were in this study not found to be associated with non-uptake of HIV testing.

Study limitations

Caution should be taken when interpreting the results of this study because of certain limitations. Generalisability of our findings is limited to TB patients on treatment in public primary care centres. As this was a cross-sectional study, causality between the compared variables cannot be concluded. A further limitation was that most variables were assessed by self-report and desirable responses may have been given. Some areas of assessment were not included in the study, which have been related to non-uptake of HIV testing in TB patients, such as HIV knowledge (6), relational factors such as seeking sexual partner's consent for HIV testing (5,22) and health system factors such as lack of provider initiated HIV counselling and testing (5,23).

Conclusion

The level of HIV testing among TB public primary care patients was suboptimal, as per policy all patients should be tested. The South African Department of Health should continue to scale-up HIV testing and other collaborative TB-HIV services at health facilities.

Ethical considerations

Ethical issues (Including plagiarism, Informed Consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc) have been completely observed by the authors.

Acknowledgements

The Department of Health in South Africa funded this study through a tender "NDOH: 21/2010-2011 Implementation and monitoring of Screening and Brief Intervention for alcohol use disorders among Tuberculosis patients" that was awarded to the Human Sciences Research Council. The authors declare that there is no conflict of interest.

References

1. Department of Health (DOH) (2009). *National tuberculosis management guidelines*. Pretoria: DOH.
2. World Health Organisation (WHO) (2010). *Global TB control report 2010*. Geneva, Switzerland: WHO, 2010.
3. Department of Health (2007). *Tuberculosis strategic plan for South Africa 2007 - 2011*. Pretoria: Government Printers.
4. World Health Organization (WHO) (2006). *Improving the diagnosis and treatment of smear-negative pulmonary and extra-pulmonary tuberculosis among adults and adolescents. Recommendations for HIV prevalent and resource-constrained settings*. Geneva, Switzerland: WHO.
5. Kigozi NG, Heunis JC, Wouters E, van den Berg HS (2011). Tuberculosis patients' reasons for, and suggestions to address non-uptake of HIV testing: a cross-sectional study in the Free State Province, South Africa. *BMC Health Serv Res*,11:110.

6. Ayenew A, Leykun A, Colebunders R, Deribew A (2010). Predictors of HIV testing among patients with tuberculosis in North West Ethiopia: a case-control study. *PLoS One*, 5(3):e9702.
7. Deribew A, Negussu N, Kassahun W, Apers L, Colebunders R (2010). Uptake of provider-initiated counselling and testing among tuberculosis suspects, Ethiopia. *Int J Tuberc Lung Dis*, 14(11):1442-6.
8. Nabbuye-Sekandi J, Okot-Chono R, Rusen ID, Dlodlo RA, Katamba A, Tumwesigye NM, Fujiwara PI (2010). Factors associated with human immunodeficiency virus testing among tuberculosis patients receiving treatment at health facilities in Uganda. *Int J Tuberc Lung Dis*, 14(7):896-902.
9. Kigozi NG, Heunis JC, Chikobvu P, van den Berg H, van Rensburg HC, Wouters E (2010). Predictors of uptake of human immunodeficiency virus testing by tuberculosis patients in Free State Province, South Africa. *Int J Tuberc Lung Dis*, 14(4):399-405.
10. Heunis JC, Wouters E, Norton WE, Engelbrecht MC, Kigozi NG, Sharma A, Ragin C (2011). Patient- and delivery-level factors related to acceptance of HIV counseling and testing services among tuberculosis patients in South Africa: a qualitative study with community health workers and program managers. *Implement Sci*, 6:27.
11. Gebrekristos HT, Lurie MN, Mthethwa N, Abdool Karim Q (2005). Knowledge and acceptability of HAART among TB patients in Durban, South Africa. *AIDS Care*, 17(6):767-772. doi: 10.1080/09540120412331336661.
12. Babor TF, Higgins-Biddle JC, Saunders JB, Monteiro MG (2001). *AUDIT: The Alcohol Use Disorders Identification Test. Guidelines for use in primary care*. Geneva: World Health Organization, Department of Mental Health and Substance Dependence. WHO/MSD/MSB/01.6a.
13. Kessler R, Andrews G, Colpe LJ, Hiripi E, Mroczek DK, Normand ST, Walters EE, Zaslavsky AM (2002). Short screening scales to monitor population prevalences and trends in nonspecific psychological distress. *Psychol Methods*, 32: 959e976.
14. Kessler RC, Barker PR, Colpe LJ, Epstein JF, Gfroerer JC, Hiripi E, Howes MJ, Normand SL, Manderscheid RW, Walters EE, Zaslavsky AM (2003). Screening for serious mental illness in the general population. *Arch Gen Psychiatry*, 60(2):184e189.
15. Jerene D, Endale A, Lindtjorn B (2007). Acceptability of HIV counselling and testing among tuberculosis patients in south Ethiopia. *BMC Int Health Hum Rights*, 7:4.
16. Njazing NB, Miguel SS, Tih PM, Hurtig AK (2010). Assessing the accessibility of HIV care packages among tuberculosis patients in the Northwest Region, Cameroon. *BMC Public Health*, 10:129.
17. Mahendradhata Y, Ahmad RA, Lefèvre P, Boelaert M, Van der Stuyft P (2008). Barriers for introducing HIV testing among tuberculosis patients in Jogjakarta, Indonesia: a qualitative study. *BMC Public Health*, 8:385.
18. Daftary A, Padayatchi N, Padilla M (2007). HIV testing and disclosure: a qualitative analysis of TB patients in South Africa. *AIDS Care*, 19(4):572-7.
19. Heunis C, Engelbrecht M, Kigozi G, Pienaar A, van Rensburg D (2009). *Counselling and testing for HIV/AIDS among TB patients in the Free State*. Bloemfontein: Centre for Health Systems Research & Development. Electronic version available at: www.ufs.ac.za/tbhctreport
20. Harries AD, Lawn SD, Getahun H, Zachariah R, Havlir DV (2012). HIV and tuberculosis—science and implementation to turn the tide and reduce deaths. *J Int AIDS Soc*, 15(2):17396.
21. Mahendradhata Y, Ahmad RA, Kusuma TA, Boelaert M, Van der Werf MJ, Kimerling ME, Van der Stuyft P (2008). Voluntary counselling and testing uptake and HIV prevalence among tuberculosis patients in Jogjakarta, Indonesia. *Trans R Soc Trop Med Hyg*, 102(10):1003-10.
22. Daftary A, Padayatchi N, Padilla M. (2007). HIV testing and disclosure: a qualitative analysis of TB patients in South Africa. *AIDS Care*, 19(4):572-7.
23. Okot-Chono R, Mugisha F, Adatu F, Madraa E, Dlodlo R, Fujiwara P (2009). Health system barriers affecting the implementation of collaborative TB-HIV services in Uganda. *Int J Tuberc Lung Dis*, 13:955-961.