



Assessment of Knowledge on Preventive and Control Measures of Pulmonary Tuberculosis among Inmates and Staff of Abakaliki Prisons, Nigeria: An Implication for Policy Implementation

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Authors' contributions

This work was carried out in collaboration between the two authors. Author BNA designed the study, wrote the protocol, and wrote the first draft of the manuscript. Author NCE managed the analyses of the study and the literature searches. Both authors read and approved the final manuscript.

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ABSTRACT

Background: Pulmonary Tuberculosis (PTB) is one of the major diseases of public health importance especially in prisons where case-finding rate has been low. The WHO established five facts of prisons PTB spread include: Prisons receive TB, Prisons concentrate TB, Prisons disseminate TB, Prisons make TB worse, and Prisons export TB. Poor TB case finding results in annual TB transmission risks of 90%. This study assessed knowledge on preventive and control measures of pulmonary tuberculosis among inmates and staff of Nigerian Prisons, Abakaliki.

Methods: A prison-based cross-sectional descriptive study was undertaken among 307 inmates and staff selected using a systematic sampling technique. Informed consent was obtained from the staff and inmates. The respondents were interviewed using a pre-tested interviewer-administered structured questionnaire. Good knowledge of pulmonary tuberculosis was assessed by the proportion of respondents who correctly answered 60% of the knowledge questions, while sputum test was done for respondents with cough of two weeks or more. Data analysis was done using

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SPSS statistical software version 22. Chi-squared test was used for bivariate analysis with level of significance set at p-value of less than 0.05. Data were treated with strict confidentiality.

Results: The mean age of inmates was 34.96 ± 5.7 years while that of staff was 38.43 ± 3.5 years. Majority of the respondents had secondary education, while about 46% and 51% of inmates and staff respectively had good knowledge of pulmonary tuberculosis. Predictors of good knowledge were educational and employment status of inmates and staff educational attainment only.

Conclusion: Knowledge on preventive and control measures of PTB was poor among respondents. This level of knowledge especially by the inmates needs to be improved upon by intensified public health campaign. High PTB burden and poor control policies within prisons potentiate high attributable risk. Implementation of current national or international cell occupancy recommendations would reduce TB transmission by 50% and 94% respectively especially now that there is an increase in the incidence of MDR-TB.

Keywords: Knowledge; PTB; prison inmates and staff.

1. INTRODUCTION

Tuberculosis (TB) in penitentiary services (prisons) is a major challenge to TB control [1]. Pulmonary Tuberculosis (PTB) is one of the major diseases of public health importance especially in prisons where case-finding rate has been low and is posing specific challenges in numerous geographical areas, particularly in low- and middle-income countries (LMICs) where more than 80% of the global TB burden reside [1]. The WHO established five facts of prisons PTB spread include: Prisons receive TB, Prisons concentrate TB, Prisons disseminate TB, Prisons make TB worse, and Prisons export TB. Poor TB case finding results in annual TB transmission risks of 90%.

Despite recent increase in public and political awareness, TB still remains a major infectious disease in prison systems for several reasons. These include but not limited to the high prevalence of multi- and extensively drug-resistant TB (M/XDR-TB) [1-8], and intravenous drug use among HIV-infected individuals, which makes prison populations more susceptible to the development of TB [9]. Prisons are considered reservoirs promoting transmission of Mycobacterium Tuberculosis (MTB) within their walls, as well as to the community at large. Transmission occurs through prison staff, visitors, and released inmates. The estimated prevalence of latent TB infection (LTBI) and active TB disease in LMICs such as Ethiopia, Thailand, and Brazil has been reported to be almost 4-, 8-, and 64-times respectively higher among prisoners compared to the general population [10,11]. Factors known to contribute to the transmission of MTB strains and hamper TB control are overcrowding, delayed case detection, poor contact tracing, inadequate

treatment of infectious cases, high turnover of prisoners, and poor implementation of TB infection control (IC) measures [12,13]. In addition, limited access to timely and quality health care services further exacerbate the situation. The prison health service is typically underprivileged and under-funded [14] and the prisons suffer from severe overcrowding, poor hygiene and inadequate ventilation, representing an epicentre for transmission of TB to close contacts and surrounding communities. Often there is no medical screening upon admission, and TB-infected prisoners are housed in crowded cells. Thus, integration of prison TB control strategies into the national TB programme should be given priority. Adequate information is needed about prisoners' awareness and practice regarding TB.

TB control could be significantly improved if more consideration is given to the population's knowledge and attitude towards TB and related health care-seeking behavior [15] by directing efforts towards making individuals more informed and aware of all aspects of TB, its treatment, and basic rules for preventing the spread of the disease to close contacts (community and family members, prison staff, inmates, and others who have social or physical contact with TB patients).

In response to the continuing challenges facing the control of TB and M/XDR-TB, and Global Plan to Stop TB (Stop TB Strategy) 2011–2015, the World Health Organization (WHO) has recently developed the End TB Strategy with the goal to end the TB epidemic by 2035 [16]. In order to define strategies that efficiently address the End TB Strategy targets, knowledge on prevention and control measures for TB in prison systems is needed. This study assessed knowledge on preventive and control measures

of pulmonary tuberculosis among inmates and staff of Nigerian Prisons, Abakaliki.

2. MATERIALS AND METHODS

2.1 Study Area and Design

A cross-sectional study was conducted at Abakaliki Prisons (the largest prisons in Ebonyi State, Nigeria) from June 2017 to August 2017. It was purposively selected. The prison has a clinic that follows the health status of the prisoners and refers cases like tuberculosis to Federal Teaching Hospital Abakaliki (FETHA) for confirmation and initiation of treatment.

2.2 Study Subjects and Sampling Technique

Prison inmates and staff were selected using systematic sampling technique from the total population ($n = 516$). In all, 307 (59.5%) inmates and 69 prison staff participated in the study.

2.3 Data Collection

A pretested structured interviewer administered questionnaire was used to collect data on socio-demographic information and knowledge, prevention and control measures TB among respondents.

2.4 Data Analysis

Data were analyzed using SPSS version 22. Respondents' knowledge on TB, its prevention

and control measures were scored and graded on a 15-point scale. One point was awarded for a correct response, while a wrong response or a non-response received no points. That gave a minimum score of '0' and a maximum score of '15' points. Those that scored ≥ 8 of 15 points were considered as having 'good' knowledge, while those that scored < 8 of 15 points were graded as having 'poor' knowledge. Frequency distribution tables were constructed and cross-tabulations done to examine the relationship between categorical variables. Chi-square test of independent association was used to test for a relationship between categorical variables. All levels of significance were set at $p < 0.05$.

2.5 Ethical Considerations

The ethical approval was obtained from the research and ethics committee of Ebonyi State Ministry of Health. Informed consent was given by the study participants. Participants were assured of confidentiality.

3. RESULTS

The mean age of inmates was 34.96 ± 5.7 years while that of staff was 38.43 ± 3.5 years. The majority had secondary education. About 46% and 51% of inmates and staff respectively had good knowledge on pulmonary tuberculosis. Predictors of good knowledge were educational status and occupation of inmates and staff educational attainment only.

Table 1. Socio-demographic profile of respondents (N= 307 for Inmates), (N=69 for Staff)

Variables	Inmates, n (%)	Staff, n (%)	Total, N=376 (%)	P-value
Sex				
Male	286 (93.2)	53 (76.8)	339 (90.2)	<0.001
Female	21 (6.8)	16 (23.2)	37 (9.8)	
Age (years)				
18-49	284 (92.5)	64 (92.8)	348 (92.6)	0.94
≥ 50	23 (7.5)	5 (7.2)	28 (7.4)	
Educational status				
<Secondary	63 (20.5)	4 (5.8)	67 (17.8)	0.02
\geq Secondary	244 (79.5)	65 (94.2)	309 (82.2)	
Occupation				
Government employees	59 (19.2)	69 (100)	128 (34.0)	FT0.03
Non-government employees	248(80.8)	0 (0)	248(66.0)	
Duration of stay				
≤ 1 year	167 (54.4)	5 (7.2)	172 (45.7)	<0.05
>1 year	140 (45.6)	64 (92.8)	204 (54.3)	

Mean age (inmates) = 34.96 \pm 5.7 years; Mean age (staff) = 38.43 \pm 3.5 years

Table 2. Knowledge of TB, prevention and control measures (N=376)

Variable	Inmates (N=307)	Staff (N=69)	Total (N=376)	P-value
Cause	n (%)	n (%)	n (%)	
Bacteria	117 (38.1)	33 (47.8)	150 (40.0)	0.71
Malnutrition	25 (8.1)	4 (5.8)	29 (7.6)	
Smoking	51 (16.6)	9 (13.0)	60 (16.0)	
Cold weather	108 (35.2)	22 (32.0)	130 (34.5)	
Do not Know	6 (2.0)	1 (1.4)	7 (1.9)	
Mode of transmission				
Inhalation of droplet from patient	206 (67.1)	37 (53.6)	243 (65.0)	0.06
Contact with TB patient	94 (30.6)	29 (42.0)	123 (32.7)	
Hand shake with infected person	4 (1.3)	0 (0)	4 (1.0)	
Do not know	2 (0.7)	3 (4.4)	5 (1.3)	
Signs and symptoms				
Cough for 2 weeks or more	171 (55.7)	29 (42.0)	200 (53.2)	0.06
Weight loss	35 (11.4)	12 (17.3)	47 (12.5)	0.90
Coughing out blood	13 (4.2)	11 (16.0)	24 (6.3)	0.81
Persistent fever	48 (15.6)	15 (21.7)	63 (16.4)	0.07
Do not know	8 (2.6)	2 (3.0)	10 (2.6)	1.00
Is it curable				
Yes	299 (97.3)	67 (97.1)	366 (97.4)	0.89
No	8 (2.6)	2 (3.9)	10 (2.6)	
Treatment				
Use of free TB medication from health facility	193 (62.2)	33 (48.0)	226 (60.0)	0.08
Traditional healers	105 (34.2)	32 (46.2)	137 (36.0)	0.09
Avoiding hand shake	6 (1.9)	3 (4.4)	9 (2.2)	0.94
Do not know	2 (0.7)	1 (1.4)	3 (0.8)	1.00
Risk of treatment default				
Prolonged cure	73 (23.8)	21 (30.4)	94 (25.0)	0.73
Relapse	95 (31.0)	16 (23.2)	111 (29.5)	0.71
Drug resistance	67 (21.8)	13 (19.0)	80 (21.3)	0.75
Death	45 (14.6)	12 (17.3)	57 (15.2)	0.80
Do not know	27 (8.8)	7 (10.1)	34 (9.0)	0.06
Prevention & control measures				
Cover mouth with handkerchiefs when coughing or sneezing	112 (36.5)	15 (21.7)	127 (33.7)	0.02
Vaccination with BCG	50 (16.3)	17 (24.6)	67 (17.8)	0.09
Good nutrition	27 (8.8)	11 (16.0)	38 (10.1)	0.09
Avoiding overcrowding especially in prisons	59 (19.2)	20 (29.0)	79 (21.0)	0.07
Avoiding hand shake with infected person	16 (5.2)	1 (1.4)	17 (4.5)	0.09
Isolating TB patients	37 (12.1)	5 (7.3)	42 (11.1)	0.25
Do not know	6 (1.9)	0 (0)	6 (1.5)	1.00

4. DISCUSSION

This study revealed gaps in knowledge of TB among inmates and staff of Abakaliki prisons. Only about 38% of inmates and 47.8% of staff identified bacteria as a cause of TB. About one-third of respondents (both inmates and staff) related the cause of TB to exposure to cold weather while a lower proportion of inmates

(16.6%) and staff (13%) misconceived smoking as the cause. This finding is in conformity with that in Northern Ethiopia where 37.7% of inmates correctly recognized germ/bacteria as a cause of TB [17]. A significant proportion of inmates (67%) and staff (53.6%) correctly identified inhalation of the droplet as the mode of transmission. This is lower than that reported in Ethiopia (88%) [17] and other places [18,19].

Table 3. Variables and their association with knowledge of TB control measures

Variables	Inmates (N=307)			Staff (N=69)		
	Good, n (%)	Poor, n (%)	AOR, 95% CI	Good, n (%)	Poor, n (%)	AOR, 95% CI
Sex						
Male	132 (43.0)	154(41.0)	0.9(0.5-2.1)	29 (42.0)	24 (34.8)	0.9(0.6–1.4)
Female	9 (3.0)	12 (4.0)		6 (8.7)	10 (14.5)	
Age (years)						
18-49	138 (45.0)	146(47.6)	0.9(0.8–1.4)	33 (47.8)	31 (45.0)	1.4(0.7–3.3)
≥50	10 (3.2)	13 (4.2)		2 (2.9)	3 (4.3)	
Residence						
Urban	76 (24.7)	38 (12.3)	2.1(4.5-6.1)	37 (53.6)	21(30.4)	2.8 (1.2-3.0)
Rural	92 (29.9)	101(32.8)		4 (5.8)	7 (10.2)	
Educational status						
< Secondary	15 (4.8)	48 (15.7)	3.1(5.6-7.4)	1 (1.4)	3 (4.3)	4.9 (4.2-6.0)
≥ Secondary	156 (50.8)	88 (28.7)		43(62.3)	22 (32.0)	
Occupation						
Government employees	36 (11.7)	23 (7.5)	2.2(1.8-3.9)	49 (71.0)	20 (29.0)	2.6 (1.8-3.9)
Non-government employees	135(44.0)	113(36.8)		0 (0)	0 (0)	
Previous contact with TB patient						
Yes	68 (22.1)	77 (25.3)	0.7(0.3-1.6)	7 (10.2)	5 (7.2)	1.1(0.7–1.6)
No	84 (27.3)	78 (25.4)		35 (50.7)	22 (31.9)	
Duration of stay						
≤ 1 year	91 (29.5)	76 (25.0)	0.9(0.6-1.3)	3 (4.3)	2 (2.9)	1.0(0.6–1.6)
>1 year	57 (18.5)	83 (27.0)		36 (52.2)	28 (40.6)	

Table 4. Predictors of prevalence and knowledge of TB

Variables	Inmates		Staff	
	AOR, 95% CI	P-value	AOR, 95% CI	P-value
Residence				
Rural	1.0		1.0	
Urban	1.4 (0.6–3.1)	0.34	1.3 (0.9–2.8)	0.13
Educational status				
≤Secondary	1.0		1.0	
>Secondary	2.1 (1.1–2.9)	0.02	2.4 (2.1–4.0)	0.01
Occupation				
Non-government employees	1.0		1.0	
Government employees	2.5 (1.4–3.3)	<0.01	-	-

A significant proportion of inmates (55.5%) and 42% of prison staff knew cough of 2 weeks duration or more as signs and symptom while 62% and 48% of inmates and staff respectively knew about free TB medication in health facilities. These reports are comparably lower than that of Northern Ethiopia for the duration of a cough (79%) and free drug availability (64.5%) [17] and elsewhere [18,19]. There is still misconception by 34.% of inmates and 46% of staff that traditional healers cure/treat TB. These differences in knowledge level may be due to the routine health education activities and improved

public media access employed in those places when compared to our study area.

However, a study conducted in Brazilian prisons reported a much lower knowledge level. In that area, prisoners might not give much attention to TB which is not a common issue like our high burden areas [20].

In this study, only 46% of inmates and 51% of prison staff had good knowledge on TB, prevention and control measures which calls for urgent need to implement appropriate health

education in prison settings across the country. Considerable proportion of the respondents had poor knowledge about TB, its prevention and control measures. This is evidenced by the fact that although 36.5% of inmate respondents identified covering mouth with handkerchiefs when coughing or sneezing, only 19.2% identified avoiding overcrowding, especially in prisons as measures of TB prevention and control. About one-third of the staff respondents knew that covering mouth with a handkerchief when coughing or sneezing and avoiding overcrowding, especially in prisons. This finding is similar to that in Eastern Ethiopia where although half of the respondents mentioned overcrowding as a factor responsible for high TB burden, none indicated that reducing the number of prisoners per cell and segregation of TB patients could be a means of TB control [21].

Many prisons worldwide are overcrowded, well beyond their official capacity [22]. Overcrowded prisons facilitate the spread of mycobacterium strains, as prisoners are in close contact with one another without access to fresh air. In some countries, the living conditions of prisoners are poor: inadequate spaces in prison cells or they are kept in isolation cells for long periods without spending time outside at all [22]. Overcrowding, poor ventilation, and prolonged confinement inside cells are all factors facilitating transmission of airborne infections. Poor ventilation may be due to inadequate prison infrastructure (e.g., lack of windows, no mechanical ventilation). The lack of mechanical ventilation systems is another major risk factor for contracting TB [23]. Furthermore, many prisoners may be heavy smokers, adding to the unhealthy environment of overcrowded cells [22].

Overcrowding leading to significantly higher rates of TB transmission in prisons also has implications for rates of TB in the community.

In light of the challenge of overcrowding associated with increased rates of TB in both the prison and community setting, TB infection control (IC) is a fundamental element for improved TB control [24]. TB IC is a combination of measures aimed at minimizing the risk of MTB transmission and includes the early and rapid identification of individuals with suspected or known TB, separation of prisoners according to their TB disease type, and effective treatment of infection or disease [25], building design or engineering methods to improve ventilation, disinfecting of the air, and the use of protective

measures for staff and visitors in contact with TB patients. TB IC is also a fundamental element of Pillar 2 of the post- 2015 End TB Strategy [16].

Summary of infection control measures in prisons include [26]

- a. Preventing the spread of infection from the community to prison by intensified TB screening of new or transferred prisoners and preparing special blocks 'Quarantine' or cells (to be used for 1–2 weeks) for new or transferred prisoners
- b. Preventing TB infection among prisoners (transmission from one TB prisoner to other prisoners) or to prison staff by conducting a contact investigation for TB suspects and cases, improving infection control (e.g., implementing organizational, administrative, and environmental interventions) in prisons, and using IC for prisoners
- c. Preventing infection of family members and the community by a released prisoner or prison staff by examining prisoners before release and examining prison staff regularly
- d. Isolation measures for TB cases and/or suspects when patients are screened or diagnosed within the prison system.

It has been argued that failure to implement TB control successfully in prisons will affect prison and public health services dramatically in the near future. This is due to the increased number of cases within the prison services and community as well as higher numbers of M/XDR-TB and/or TB/HIV cases. New tools such as the GeneXpert MTB/RIF should be implemented in prison clinic or facilities where prisoners receive TB treatment. Although we are entering an exciting period of innovation e.g. introduction of GeneXpert MTB/RIF and new medicines like delamanid and bedaquiline [27], TB control in prisons still remains a neglected priority.

5. CONCLUSION

This study found only 46% of inmates and 51% of prison staff with good knowledge on TB, prevention and control measures. This calls for urgent need for policy implementation of appropriate health education in prison settings across the country. Educational interventions in the studied prisons should not only focus on delivering the message, but also ensure that the

knowledge gained can lead to the implementation of appropriate infection prevention practice through regular monitoring and evaluation, and also ensuring clearly defined treatment protocols.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

- World Health Organization. Global tuberculosis report 2013. WHO/HTM/TB/2013. 11. Geneva: WHO; 2013.
- Stop TB. Partnership. The global plan to stop TB 2011-2015: transforming the fight towards elimination of tuberculosis. WHO/HTM/STB/2010. 2. Geneva: WHO; 2010.
- Raviglione M, Marais B, Floyd K, Lonroth K, Getahun H, Migliori GB, et al. Scaling up interventions to achieve global tuberculosis control: progress and new developments. *Lancet*. 2012;379:1902–13.
- Dara M, Chadha SS, Vinkeles MNV, Melchers NV, Van den HJ, Gurbanova E, et al. Time to act to prevent and control tuberculosis among inmates. *Int J Tuberc Lung Dis*. 2013;17:4–5.
- Migliori GB, Sotgiu G, Gandhi NR, Falzon D, DeRiemer K, Centis R, et al. Drug resistance beyond extensively drug-resistant tuberculosis: individual patient data meta-analysis. *Eur Respir J*. 2013;42:169–79.
- Floyd K, Hutubessy R, Kliiman K, Centis R, Khurieva N, Jakobowiak W, et al. Cost and cost-effectiveness of multidrug-resistant tuberculosis treatment in Estonia and Russia. *Eur Respir J*. 2012;40:133–42.
- Zhao Y, Xu S, Wang L, Chin DP, Wang S, Jiang G, et al. National survey of drug-resistant tuberculosis in China. *N Engl J Med*. 2012;366:2161–70.
- Post FA, Grint D, Werlinrud AM, Panteleev A, Riekstina V, Malashenkov EA, et al. Multi-drug-resistant tuberculosis in HIV positive patients in Eastern Europe. *J Infect*. 2014;68:259–63.
- El-Bassel N, Shaw SA, Dasgupta A, Strathdee SA. Drug use as a driver of HIV risks: re-emerging and emerging issues. *Curr Opin HIV AIDS*. 2014;9:150–5.
- Banu S, Hossain A, Uddin MK, Uddin MR, Ahmed T, Khatun R, et al. Pulmonary tuberculosis and drug resistance in Dhaka central jail, the largest prison in Bangladesh. *PLoS One*. 2010;5: 75-77.
- Abebe DS, Bjune G, Ameni G, Biffa D, Abebe F. Prevalence of pulmonary tuberculosis and associated risk factors in Eastern Ethiopian prisons. *Int J Tuberc Lung Dis*. 2011;15:668–73.
- Stuckler D, Basu S, McKee M, King L. Mass incarceration can explain population increases in TB and multidrug-resistant TB in European and central Asian countries. *Proc Natl Acad Sci U.S.A.* 2008;105:13280–5.
- Baussano I, Williams BG, Nunn P, Beggiato M, Fedeli U, Scano F. Tuberculosis incidence in prisons: a systematic review. *PLoS Med*. 2010;7:13-15
- Moller L, Gatherer A, Dara M. Barriers to implementation of effective tuberculosis control in prisons. *Public Health*. 2009;123: 419–421.
- Storla D G, Yimer S, Bjune G A. A systematic review of delay in the diagnosis and treatment of tuberculosis. *BMC Public Health*. 2008;8:15.
- World Health Organization. Draft global strategy and targets for tuberculosis prevention, care and control after 2015. Report by the Secretariat. Sixty-seventh World Health Assembly. WHO; March 14, 2014. Available:http://apps.who.int/gb/ebwha/pdf_files/WHA67/A67_11-en.pdf?ua=1. (Accessed November 9, 2017).
- Adane K, Spigt M, Johanna L, Noortje D, Abera SF, Dinant GJ. Tuberculosis knowledge, attitude, and practice among northern Ethiopian prisoners: Implications for TB control efforts. *PLoS ONE*. 2017;12(3):5-8. DOI:<https://doi.org/10.1371/journal.pone.0174692>
- Esmael A, Ali I, Agonafir M, Desale A, Yaregal Z, DestaK.. Assessment of patients' knowledge, attitude, and practice regarding pulmonary tuberculosis in eastern Amhara regional state, Ethiopia: cross-sectional study. *Am. J. Trop. Med. Hyg*. 2013;88(4):785-788.
- Tolossa D, Medhin G, Legesse M. Community knowledge, attitude, and practice towards tuberculosis in Shinile town, Somali regional state, eastern Ethiopia: a cross-sectional study. *BMC Public Health*. 2014;14(1):1.

20. Ferreira S J, Oliveira HBD, Marin-Leon L. Knowledge, attitude and practices on tuberculosis in prisons and public health services. *Revista Brasileira de Epidemiologia*. 2013;16(1):100-113. PMID: 23681327
21. Abebe DS, Bjune G, Ameni G, Biffa D, Abebe F. Prevalence of pulmonary tuberculosis and associated risk factors in Eastern Ethiopian prisons. *Int J Tuberc Lung Dis*. 2011;15:668–73
22. International Centre for Prison Studies. Guidance Note 4: dealing with prison overcrowding. London: ICPS; 2011. Available:http://www.prisonstudies.org/images/news_events/gn42_ndedv2.pdf (Accessed December 11, 2017)
23. Vieira AA, Ribeiro AS, Siqueira MA, Galesi MNV, Santos ARL, Golub EJ. Prevalence of patients with respiratory symptoms through active case finding and diagnosis of pulmonary tuberculosis among prisoners and related predictors in a jail in the city of Carapicuíba, Brazil. *Rev Bras Epidemiol*. 2010;13:641-650
24. Bick JA. Infection control in jails and prisons. *Clin Infect Dis*. 2007;45:1047–55.
25. Sotgiu G, D'Ambrosio L, Centis R, Bothamley G, Cirillo DM, De Lorenzo S, et al. TB and M/XDR-TB infection control in European TB reference centres: the Achilles' heel? *Eur Respir J*. 2011;38:1221–3.
26. Dara M, Colleen DA, Natalie VS, Vinkeles M, Haider AA, Dato C, et al. Tuberculosis control in prisons: current situation and research gaps. *International Journal of Infectious Diseases*. 2015;32:111–117
27. Diacon AH, Dawson R, von Groote-Bidlingmaier F, Symons G, Venter A, Donald PR, et al. 14-day bactericidal activity of PA-824, bedaquiline, pyrazinamide, and moxifloxacin combinations: a randomised trial. *Lancet*. 2012;380:986–93.

QUESTIONNAIRE

KNOWLEDGE ON PREVENTIVE AND CONTROL MEASURES OF PULMONARY TUBERCULOSIS AMONG INMATES AND PRISON STAFF OF NIGERIA PRISONS SERVICE ABAKALIKI

Please tick in the appropriate box provided or fill in the gap where appropriate.

Thank you for your time.

PLEASE TICK APPROPRIATELY: **STAFF** **INMATE**

1. Age: 18yrs-30yrs 31yrs- 49yrs 50yrs- 69yrs ≥ 70yrs
2. Sex: Male Female
3. Highest Academic qualification:
 Postgraduate (PgD, MSc, PhD etc) Graduate (BSc, HND, OND, etc)
 SSCE First School Leaving Certificate (FLCE) No formal education
4. How long have you been a staff here? _____ (*staff only*)

Inmates only (please tick as appropriate):

5. Occupation before now: Professional Civil servant Business/Trading
 Banker Student Other (Specify) _____
6. Duration of stay in prison _____ (days, weeks, months, years)
7. Where do you live? Rural Urban
8. Have you ever had contact with TB patient? Yes No

SECTION A

9. Have you heard of tuberculosis before? Yes No
10. How did you get to know about tuberculosis?
 - Family members - Television/radio - Friends - Poster
 - Hospital - School - Others (specify) _____
11. Tuberculosis is caused by
 - Bacteria Yes No I don't know
 - Malnutrition Yes No I don't know
 - Smoking Yes No I don't know
 - Cold weather Yes No I don't know
 - Don't know Yes

12. How can a person get tuberculosis?
- Inhalation of droplet from patient Yes No
 - By shaking a person's hand Yes No
 - By contact with TB patient Yes No
 - I don't know Yes
13. A person with tuberculosis will:
- a. Cough for 2 weeks or more Yes No I don't know
 - b. Start losing weight Yes No I don't know
 - c. Cough out blood Yes No I don't know
 - d. Have persistent fever Yes No I don't know
 - e. Do not know Yes
14. Can tuberculosis be treated? Yes No
15. The following are ways TB can be treated
- a. Use of free medication from hospital Yes No I don't know
 - b. Traditional healer Yes No I don't know
 - c. Avoiding hand shake Yes No I don't know
 - d. Do not know Yes
16. The following are risk of TB treatment default
- a. Prolonged cure Yes No I don't know
 - b. Relapse Yes No I don't know
 - c. Drug resistance Yes No I don't know
 - d. Death Yes No I don't know
 - e. Do not know Yes

SECTION B

17. Tuberculosis can be prevented or controlled by
- a. Covering mouth with handkerchief when coughing or sneezing Yes No I don't know
 - b. Vaccination with BCG Yes No I don't know
 - c. Good nutrition Yes No I don't know

- d. Avoiding overcrowding esp. in prisons Yes No I don't know
- e. Avoiding hand shake with infected person Yes No I don't know
- f. Isolating TB patients Yes No I don't know
- g. Do not know Yes

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