

KNOWLEDGE AND ATTITUDE TOWARDS TUBERCULOSIS (TB) AMONG STUDENTS OF KWARA STATE COLLEGE OF EDUCATION, ILORIN: IMPLICATION FOR HEALTH TRANSFORMATION FOR SUSTAINABLE AFRICAN DEVELOPMENT

¹Williams*, F.E., ²Adesoye A.A., ³Jolayemi, E.T., ⁴ Parakoyi, D.B.,

⁴Awoyemi, A.O. ²Dominic, O.L., ⁴Kayode O.O. and ⁵Nyamngee, A.

¹Department of Clinical Pharmacy and Pharmacy Practice, University of Ilorin, Ilorin. Nigeria.

² Department of Human Kinetics and Health Education, University of Ilorin, Ilorin, Nigeria.

³ Department of Statistics, University of Ilorin, Ilorin, Nigeria .

⁴Department of Epidemiology and Community Health, University of Ilorin, Ilorin, Nigeria.

⁵Department of Medical Microbiology and Parasitology, University of Ilorin, Ilorin, Nigeria.

Corresponding Author E-mail and mobile number:

williams.fe@unilorin.edu.ng; +2348033354532

Abstract

Tuberculosis, a re-emerging disease, poses a challenge to health transformation for sustainable African development. More than one third of the world's population is currently infected with the tubercle bacilli. In congregate settings such as tertiary institution campus, delay in diagnosis increases the potential for transmission. Knowledge of a community about TB can improve the attitude towards the disease with consequent better health seeking behaviour. This study examined the knowledge and attitude towards tuberculosis among students of Kwara State College of Education, Ilorin. It was a descriptive, cross-sectional and non-

interventional study using structured questionnaire tested for reliability giving a value of 0.99. Four hundred and five (405) eligible students were interviewed using the structured questionnaires. Statistical Package for Social Sciences Version 17.00 was used for data entry and analysis. The findings revealed the mean score of 58.7% for knowledge. Many of the respondents knew that smoking (71.1%) and overcrowding (60.2%) were risk factors that contribute to TB transmission. Moreover, the mean score for attitude was 54%. Above half of the respondents (60.5%) felt that lack of information and education about TB promote the spread of the disease. Nonetheless, 46.7% and 46.9% felt that prospective marital relationship and marital relationship respectively should not be broken if laboratory tests are positive for TB. The students should be provided with routine health education about the disease in order to improve the knowledge and attitude towards the disease. This will lead to positive health transformation for sustainable African development.

Keywords: Knowledge, Attitude, Tuberculosis, Risk Factors

INTRODUCTION

Tuberculosis (TB), an infection caused by *Mycobacterium tuberculosis* as discovered by a German doctor, Robert Koch on March 24 1882 has been present in the human population since antiquity. Fragments of the spinal column from Egyptian mummies from 2000 BC show definite pathological signs of tuberculosis decay (Lawal, 2005). Despite it is preventable, treatable and curable it remains second disease after HIV (WHO, 2012).

According to the World Health Organization (WHO) estimates, 8.7 million people were sick due to TB while 1.4 million TB related deaths occurred globally in 2011, (WHO, 2012). Geographically, Africa contributes 25% of the global disease burden. In Nigeria with a population estimates of 162.471 million people, 280,000 people were sick of TB in 2011 of which 190,000

were new cases and TB related death was 27,000 (WHO, 2012). This high TB burden mitigate against attainment of sustainable development goals since humans are the centre of sustainable development (WHO, 2002).

On exposure of an individual to *M. tuberculosis* bacilli, the bacilli are ingested by macrophages (in the immune system). However, the bacilli persist intracellularly in the macrophages in a quiescent state and may become activated later time thus affecting the immune system. It is also worthy of note that tuberculosis is one of the opportunistic infections that can kill HIV positive people (Lawal, 2005). The co-infection has been referred to as “cursed duet” (Pennep, *et al.*, 2010). There is reciprocal interaction between the two infections rather than simply being a case of co-existence of both infections in the same patient. Both HIV and TB attack the immune system that is supposed to protect the human body. The chances of survival of HIV positive patients with TB is decreased compared to HIV positive patents with matched CD4 count that do not have TB. Also, the decline in CD4 count among people with HIV can be accelerated. TB is also the most common cause of AIDS-related death (Pawlowski *et al.*, 2012). The international community's effort to achieve the health-related United Nations Millennium Development Goals for TB and HIV infections is threatened by this complex interaction between TB and HIV (Gtahun *et al.*, 2010). This situation adversely affects health transformation for sustainable development.

Tuberculosis exits in two stages: latent tuberculosis TB infection and active tuberculosis disease. In TB infection (latent TB), the bacilli are controlled or contained by the macrophages in host immune system and thus are non-infectious and asymptomatic (Lawal 2005). Despite tubercle skin test is positive it is not a case of TB disease. The chest x-ray is normal, the sputum smear and

culture are negative. Latent TB infection may become active at any age producing clinical TB in any organ, most often the apical area of the lungs (pulmonary TB) but can affect other organs such as the kidneys, bones, vertebrae, brain, pleura and lymph nodes. Activation may occur 1 or 2 years of initial infection but may be delayed for years or decades and may be activated after onset of diabetes mellitus, during period of stress, after treatment with corticosteroids or other immunosuppressants in adolescence or later in life (greater than 70 years of age) especially after HIV infection. In addition gastrectomy and silicosis also predispose an individual to active TB (Eddleston & Pierini, 2002; Lawal, 2005).

TB disease occurs as pulmonary TB and extra-pulmonary TB (Nelliyanil *et al*, 2012 Federal Ministry of Health, Nigeria, 2010). The cardinal symptom of pulmonary TB is persistent cough for 3 or more weeks which usually often worsens in the morning and sometimes there is haemoptysis (Lawal 2005). Other non-specific symptoms include weight loss, night sweats, fever, anorexia, malaise and signs of pneumonia. Physical examination using a stethoscope may reveal diminished breathing sound, bronchial breathing, tracheal denation and coarse crackles (Lawal, 2005; Eddleston and Pierini, 2002). Studies show that weight loss, fever, prolonged cough and hemoptysis were perceived to be associated with TB disease (Ganapathy *et al.*, 2008; Buregyeya *et al.*, 2011; Mushtaq *et al.*, 2011). The symptoms of extra-pulmonary TB depends on the affected organ.

Diagnostic methods of TB include microscopic examination of Ziehl-Neelsen stained smears of sputum or tissue with a light microscope under oil immersion, Acid alcohol fast – Bacili (AFB) test (Eddleston and Pierini, 2002) and culturing the bacteria in the samples such as sputum or tissue and confirming that the culture

is *M.tuberculosis* which can take several weeks but it is confirmatory. Other diagnostic methods include radiography in which chest X-ray reveals cavitation, calcification and nodes in the upper lobes of the lungs (this is useful but not confirmatory) and tuberculin skin tests (Mantoux and Heaf tests), blood test called QuantiFERON-TB Gold (QFT) and microscopic-observation drug susceptibility (MODS) assay involving the use of sputum samples.(American Lung Association, 2013).

Tuberculosis disease is a contagious disease (Nelliyanil *et al*, 2012). It is transmitted through inhalation of infective droplet mucus, infected air borne particles which are generated from TB patients when he/she coughs, sneezes, talks, sings or spits. Risk factors that contribute the transmission of TB include over-crowding, poverty, poor ventilation, poor housing, malnutrition, suppression of the immune system due to chemotherapy or infections such as *Human Immunodeficiency Virus* (HIV), smoking, long term use of alcohol, drug resistant strains of TB, health care work and age (Narasiham *et al.*, 2013)

TB is preventable, treatable and curable. The first line medicines used for the treatment of active TB include rifampicin, isoniazid, pyrazinamide, ethambutol and streptomycin. According to WHO (2005), the recommended strategy to control TB is pharmacotherapy based on Directly Observed Treatment Short course (DOTS). There are two treatment categories based on case definition: category 1 (new cases) and category 2 (re-treatment cases). The treatment regimen consists of two phases: initial intensive phase of 2 months (category 1) or 3 months (category 2) and continuation phase of 4 or 6 months (category 1); or 5 months (category 2) (WHO, 2010). TB can be cured if the treatment regimen is strictly adhered to (Civil Society Perspective on TB/HIV 2006). In addition, TB preventive measures as

recommended by World Health Organization (WHO, 2012) include provision of isoniazid preventive therapy (IPT) for HIV positive people without active TB, intensified case finding for TB among people living with HIV/AIDS (PLWHA). Moreover, healthy life style such as regular physical exercise can prevent activation of TB infection by aiding the body to fight the TB infection, speed up the healing process and improve the patient's mood (Sessoms, 2011; University of Virginia Health System, 2012). However in TB patients, minimal exercise restoration program should be instituted when the patient is afebrile (Chapman and Hollander, 1964).

Previous studies revealed that more than half of the respondents knew that night fever (89.9%), tiredness (86.5%), productive cough (80.6%), and productive cough of more than 3 weeks (61.6%) are symptoms of TB (Tansmin *et al*, 2012). With regards to the mode of transmission of TB, the same study showed that 56% of the respondents were aware that it could spread through sneezing/coughing. Also, almost of the respondents (98.6%) knew that TB can be cured (Tansmin *et al*, 2012). In another study, more than half of the respondents (55.7%) knew that TB can be transmitted through droplets during sneezing and coughing (Seyoum and Legesse 2013). In the same study, nearly two thirds (59%) of the respondents knew that cough greater than two weeks, night sweat weight loss, and loss of appetite are major symptoms of TB. In addition, the attitude towards TB, was 89.4% according to a study in Zambia (Mweemba *et al*, 2008) while another study showed that 65.7% of the respondents felt compassion for TB patients and desire to help these patients (Tansmin *et al*, 2012).

The knowledge and attitude of individuals, families and communities towards a disease affects the health seeking

behaviour. Poor knowledge about TB and traditional misbeliefs (which influences attitude) have been associated with delays with case detection (Buregyeya *et al.*, 2011; Shetty *et al.*, 2004). This would prevent the attainment of Target 6C of Goal 6 of the millennium Development Goals: have halted by 2015 and begun to reverse the incidence of malaria and other major diseases with TB inclusive (WHO 2005). The attainment of this MDG is a major health transformation that would result in sustainable development in Africa in view of the disease burden on its own and especially as co-infection with HIV.

This study was designed to determine knowledge and attitude towards TB among students of Kwara State College of Education, Ilorin and its implication for health transformation for sustainable African development.

The following research questions were answered by this study:

- a. What is the level of knowledge of the students about TB?
- b. What is the attitude of the students towards TB?

MATERIALS AND METHOD

Research design

A descriptive cross-sectional study was adopted for the study. A total of 405 subjects (Fisher *et al.*, 1998) who satisfied statistical requirements and met the inclusion criteria were used for this study. A multistage sampling technique was used to select eligible subjects. The College was stratified into schools and departments. Simple random sampling was used to select three schools from five schools of the college and at least 50% of the departments of the 3 schools. The departments have different classes: NCE I, NCE II and NCE III with each class contributing equally to the study sample.

Inclusion criteria

The following inclusion criteria were used in selection of respondents:

- a. Students who were on full-time National Certificate in Education (NCE) academic programme.
- b. Students who were in school during the period of the research.

Exclusion criteria

The following exclusion criteria were used in selection of respondents:

- c. Students who were on pre-NCE or Interim Joint Matriculation Board programme.
- d. Students who were on programmes affiliated with other Universities
- e. Students who were on sandwich programme.

Research instrument

The research instrument used to collect data was structured questionnaire comprising of had three sections. Section A: questions related to the socio-demographic characteristics of the respondents; Section B: questions related to their knowledge about TB while Section C: questions related to their attitude towards TB. The validity of the research instrument was ensured with regards to content, criterion and construct. The reliability of the test instrument was ensured at the pre-test stage at the Kwara State College of Education, Oro (10% of the study's sample size) using the test-retest method with an interval of 2 weeks between the first and second tests. Subjecting both scores to Pearson's Product Moment correlation analysis yielded a

correlation coefficient (r) value of 0.99 which indicated the suitability of the research instrument for the study.

Data analysis

The questionnaires were checked for accuracy and completeness. The data entry and analysis were done using Statistical Package for Social Sciences (SPSS) version 17.00. Frequency distributions of quantitative variables were generated.

Ethical considerations

Permission for the use of the students in the research was obtained from the Management of the Kwara State College of Education, Ilorin. Consent of the respondents was sought and obtained. Research ethics such as anonymity of respondents and confidentiality of the responses were ensured.

RESULTS

Majority of the respondents were of age range 20-24 years (45.7%), males (53.3%), and single (85.4%) with regards to marital status. Most of those who were married, practiced monogamy (60%).

TABLE I: DEMOGRAPHIC CHARACTERISTICS OF RESPONDENTS

CHARACTERISTICS	FREQUENCY	PERCENTAGE
AGE		
15 - 19 years	105	25.9
20 - 24 years	185	45.7



25 - 29 years	115	28.4
Total	405	
GENDER		
Female	189	46.7
Male	216	53.3
Total	405	
MARITAL STATUS		
Single	346	85.4
Married	53	13.1
Separated	2	0.5
Divorced	2	0.5
Widowed	2	0.5
Total	405	
TYPE OF MARRIAGE		
Monogamy	35	66.0
Polygamy	18	34.0
Total	53	

KNOWLEDGE OF RESPONDENTS ABOUT TUBERCULOSIS (TB)

Tuberculosis though an infectious disease has laboratory tests and chest x-ray that can detect it. Day time, outdoor transmission is rare. TB is preventable, treatable and curable.

Table II: Knowledge of Respondents about TB

ITEMS	YES		NO		DON'T KNOW	
	Freq.	%	Freq.	%	Freq.	%
A. Tuberculosis is caused by Mycobacterium tuberculosis.	242	59.8	40	9.9	123	30.4
B. Tuberculosis is transmitted through inhalation of infected droplets caused by talking coughing and sneezing.	284	70.1	57	14.1	64	15.8
C. Daytime outdoor transmission is rare.	172	42.5	57	14.1	64	15.8
D. There are differences between TB infection and TB disease.	201	49.6	98	24.2	106	26.2
E. There are laboratory tests and chest x-ray used to detect TB disease.	296	73.1	51	12.6	58	14.3
F. TB can affect many organs in the body.	307	75.8	46	11.4	52	12.8

G. Many people have died due to TB.	329	81.2	30	7.4	46	11.4
H. TB can be treated	330	81.5	39	9.6	36	8.9
I. TB can be cured	265	65.4	92	22.7	48	11.9

Many of the respondents knew that TB can be treated (81.5%), many people have died due to TB (81.2%), TB can affect many organs in the body (75.8%), there are laboratory tests and chest x-ray that can be used to detect TB disease (73.1%), TB can be transmitted through inhalation of TB infected droplets generated through talking, coughing and sneezing (70.1%) and TB can be cured (65.4%). Also, above half of the respondents knew that the causative organisms of TB is Mycobacterium Tuberculosis (59.8%) while below half knew that day-time-outdoor transmission is rare (42.5%) and there is a difference between TB infection and TB disease (49.6%).

Table III: Knowledge of Respondents about Risk Factors that contribute to the transmission of TB

RISK FACTORS		YES		NO		DON'T KNOW	
		Freq.	%	Freq.	%	Freq.	%
a.	Over crowding	244	60.2	117	28.9	44	10.9
b.	Poverty	200	49.5	115	38.4	50	12.3
c.	Poor ventilation	225	55.6	126	31.1	54	13.3
d.	Malnutrition	183	45.2	153	37.8	67	16.6
e.	HIV infection	210	52.0	127	31.2	68	16.8
f.	Age	104	25.7	236	58.2	65	16.0
g.	Alcohol	226	55.8	115	28.3	64	15.8
h.	Suppression of the immune system	217	53.6	92	22.7	96	23.7
i.	Poor housing	182	44.9	150	37.0	73	18.0
j.	Spitting	204	50.4	130	32.1	71	17.5
k.	Smoking	288	71.1	69	17.0	48	11.9
l.	Healthy lifestyle	169	41.7	160	39.5	76	18.8

Many of the respondents knew that smoking (71.1%) and overcrowding (60.2%) are risk factors that contribute to TB transmission. Above half of the respondents knew that alcohol (55.8%), poor ventilation (55.6%), immune system suppression (53.6%), HIV infection (52.0%) and spitting (50.4%) are risk factors that contribute to TB transmission. However below half of the respondents knew that poverty (49.5%) malnutrition (45.2%), poor

housing (44.9%) and age (25.7%) are also risk factors that contribute to TB transmission. It is note-worthy that only 39.5% knew that healthy life style is not a risk factor that contributes to the transmission of tuberculosis.

With reference to symptoms of TB, more than half of the respondents knew that weight loss (73.0%), anorexia (65.3%), fever (66.2%), malaise [feeling of uneasiness (62.0%)], night sweats (56.0%) and cough (59.5%) are the symptoms of TB disease as seen from figure 1.

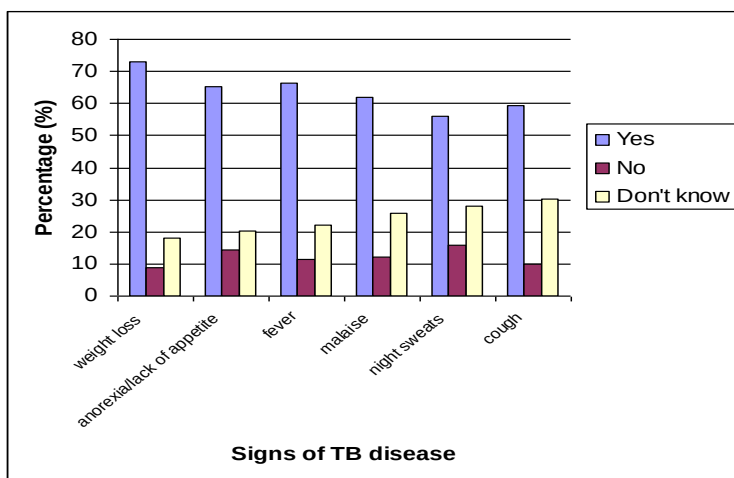


Figure 1: Knowledge of Respondents about signs of TB

The knowledge of the respondents about TB on the average is 58.7%

ATTITUDES OF RESPONDENTS TOWARDS TB

Table IV: Attitude of respondents towards TB

ITEMS	YES		NO		DON'T KNOW	
	Freq.	%	Freq.	%	Freq.	%
A. Lack of information and education about the disease promote TB.	245	60.5	100	24.7	60	14.8
B. TB patients should be isolated.	204	50.4	171	42.2	30	7.8
C. Play, talk and have anything to do with students that have TB.	230	56.8	143	35.1	33	8.1
D. Sympathize with fellow students that have TB	262	64.7	96	23.7	47	11.6

Above half of the respondents felt that they can sympathize with fellow students with TB (64.7%), lack of information and education about the disease promote the spread of the disease (60.5%) and TB infected persons can be played, talked and interacted with (56.8%). However, about half of the students felt

that TB patients should be isolated from other persons (50.4%) as seen from table IV.

Moreover above half of respondents felt that students diagnosed to be suffering from TB should not be expelled from school (61.8%) while below half felt high level of stigmatization and discrimination does not prevent spread of TB disease (44.2%), relationship with future partner should not be broken if premarital laboratory tests reveal he/she has TB (46.7%), relationship with spouse should not be broken if laboratory tests reveals he/she has TB (46.9%) as shown in figure 2.

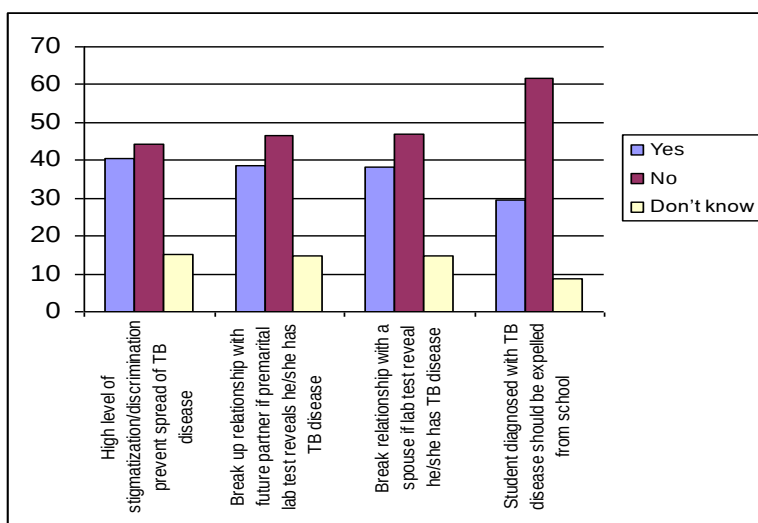


Figure 2: Attitude of Respondents towards TB

The mean score for attitude of the respondents towards TB was 54%.

DISCUSSION

The age range of the respondents 15- 29 years falls within the age group that is most very vulnerable and economically most productive. The congregate nature of tertiary institutions encourages overcrowding which is a risk factor for the transmission of TB.

The mean score for knowledge about TB in this study was 58.7%. This knowledge about TB can positively affect the health and treatment seeking behaviour; and implementation of TB preventive strategies. Also, individuals who have good knowledge about the disease are more likely to protect themselves from the disease. Consequently, good knowledge about TB could positively impact on health transformation for sustainable development.

Specifically, majority of the respondents (59.8%) knew that *Mycobacterium tuberculosis* (a bacterium) is the causative organism of TB. The respondents had better knowledge than that of a study in Bangladesh (Tansnim *et al.*, 2012). This difference may be due to the study population. The study in Bangladesh was conducted among TB patients while this study was conducted among tertiary students whose knowledge about TB could have been influenced by their educational background and ability to access information since information and education are factors that affect an individual's knowledge.

Also, majority of the respondents in this study had good knowledge about the mode of transmission of TB, being droplets caused by talking, coughing and sneezing (70.1%). This level of knowledge is higher than that in the study conducted in Ethiopia (Seyoum and Legesse, 2013). The difference may also be due to the difference in the study population. In addition, the respondents have good knowledge that laboratory tests or chest X-ray are used to detect TB disease (73.1%), TB can affect many

organs in the body (75.8%), many people have died due to TB (81.2%), TB being treatable (81.5%) and TB being curable (65.0%). However, poor knowledge about rare daytime out-doors transmission; and there being a difference between TB infection and TB disease are areas for health information, education and communication that should be education institution based.

A high knowledge of the risk factors that contribute to the transmission of TB is particularly important or the implementations of evidence-based TB control and intervention programmes. In this study, while the mean score for knowledge about the risk factors that contribute to the transmission of TB was 50.3% knowledge of the respondents about risk factors such as poverty, poor housing malnutrition and age are below average. This is an indication for health information, education and communication that could lead to the attainment of the MDG 6, target 6C with consequent health transformation for sustainable development.

In addition, majority of the respondents have good knowledge about the symptoms of TB. This is similar to the findings of the study conducted in Ethiopia (Seyoum and Legesse, 2013). This could be due to the student's educational background and their access to right information. Also, the patients' knowledge could have been influenced by their experience. This high level of knowledge should be maintained through sustained adequate health information, education and communication.

Regarding the attitude of the students towards TB, the mean score was 54%. Nearly two-third of the respondents have positive attitude towards TB in general areas where no intimate interactions with TB patients. This finding is similar to that of a study in Bangladesh (Tansmin *et al.*, 2012). However, the attitude became less positive in areas that involve intimate interactions

such as not breaking relationship with prospective marital partner (46.7%) or partner (46.9%) if laboratory tests reveal that he/she has TB. This is an indication of stigmatization which impacts negatively on health and treatment seeking behaviour with consequent delay in case detection and treatment. The quality of life of TB patients and TB preventive and control strategies would be negatively affected with resultant high transmissibility of the TB. Adequate health information, education and communication about the disease could reduce or eliminate this negative attitude with consequent positive health transformation and sustainable development.

CONCLUSION

The knowledge and attitude of the students towards TB is fairly good. However, poor knowledge exists with regards to rare out door or daytime transmission of TB; and a difference between TB infection and TB disease. Also, negative attitude towards TB exists in areas of personal relationships with prospective marital partner and marital partner.

REFERENCES

American Lung Association (2013). Tuberculosis Fact Sheet. Retrieved from <http://www.lung.org/lung-disease/tuberculosis/tuberculosis-fact-sheet.html>.

Accessed 14/6/2013

Buregyeya, E., Kulane, A., Colebunders, R., Wajja, A., Kiguli. J., Mayaja, H., Musoke P.,... Mitchell E. M. (2011). Tuberculosis

knowledge, attitudes and health-seeking behaviour in rural Uganda. *International Journal of Tuberculosis and Lung Disease*, 15(7), 938–942.

Centers for Disease Control (2013). Testing for TB Infection.

<http://www.cdc.gov/tb/topic/testing/default.htm> . Accessed on 13/6/2013.

Chapman, C. E., & Hollander, G. A. (1964). Tuberculosis and rehabilitation-dynamic physical restoration of patients with active disease. *California Medicine*, 100(2): 88-91.

Eddleston, M., & Pierini, S. (2002). Oxford Handbook of Tropical Medicine Oxford. New York: University Press Inc.

Federal Ministry of Health, Nigeria, (2010) National Tuberculosis and Leprosy Control Programme (NTBLCP). (5th Edition). Abuja: Author.

Fischer A. A., Lang J. E., Stoekel J. E., & Townsend J.W. (1998). Sampling. Handbook for family planning and operation Design. (2nd edition). New York: Population Council.

Ganapathy, S., Thomas, B. E., Jawahar M. S., Selvi, K. J., Sivasubramaniam, & Weiss, M. (2008). Perceptions of gender and tuberculosis in a south Indian urban community. *The Indian Journal of Tuberculosis*, 55(1), 9–14.

Gatahun, H., Gunneberg, C., Granich, R. & Nunn, P. (2010). HIV Infection—Associated Tuberculosis: The Epidemiology and the Response. *Clinical Infectious Diseases*, 50 (Supplement 3), S201-S207.

Lawal, F.O. (2005). A review of Tuberculosis and Management. *Drug Bulletin*, 4(1), 3 – 12.

Mushtaq, M. U., Shahid, U., Abdullah, H. M., Saheed, A., Omer, F. Shad. M.A.,...Akram, J. (2011). Urban-rural inequities in knowledge, attitudes and practices regarding tuberculosis in two districts of Pakistan's Punjab province. *International Journal for Equity in Health*, 10(1), 8, doi: 10.1186/1475-9276-10-8.

Mweemba, P., Haruzivishe, C., Siziya, S., Chipimo, P. J., Cristenson, K., & Johansson, E. (2008). Knowledge, attitude and compliance with tuberculosis treatment, Lusaka, Zambia. *Medical Journal of Zambia*, 35(4), 121-128.

Narasiham, P., Wood, J., Macintyre, C. R., & Mathai, D. (2013) Risk factors for tuberculosis. *Pulmonary Medicine*, 2013: 828939

Nellyyanil, M., Sharada, M. P., Joseph, N., Basagoudar, S. S., Jayaram, S., & Patil, D. C. (2012). A study of the socio-demographic profile and treatment outcome of paediatric tuberculosis patients in Bangalore Mahanagar Palike area. *The Indian Journal of Tuberculosis*, 59(4): 207-213

Pawlowski, A., Jansson, M., Sköld, M., Rottenberg M. E. & Källenius, G. (2012). Tuberculosis and HIV Co-Infection. *PLoS Pathogens*, 8(2): e1002464.

Pennap, G., Makpa, S. & Ogbu, S. (2010). Sero-prevalence of HIV infection among tuberculosis patients in a rural tuberculosis referral clinic in northern Nigeria. *The Pan African Medical Journal*, 5: 22.

Sessoms, G. (2011). Work & Exercise For People With TB. Retrieved from

<http://www.livestrong.com/article/394127-work-exercise-for-people-with-tb/>.

Accessed on 10/5/2013.

Seyoum, A., & Legesse, M. (2013). Knowledge of tuberculosis (TB) and human immunodeficiency virus (HIV) and perception about provider initiated HIV testing and counselling among TB patients attending health facilities in Harar town, Eastern Ethiopia. *BMC Public Health*, 13: 124 doi:10.1186/1471-2458-13-124

Shetty, N., Shemko, M., & Abbas, A. (2004). Knowledge, attitudes and practices regarding tuberculosis among immigrants of Somalian ethnic origin in London: a cross-sectional study. *Communicable Disease and Public Health/PHLS*, 7(1), 77–82.

Tansmin, S., Rahman, A., & Hoque, F. M. (2012). Patient's Knowledge and Attitude towards Tuberculosis in an Urban Setting. *Pulmonary Medicine*, 2012:352850

The Open Society Institute and The Treatment Group (2006). *Civil Society Perspective on TB/HIV*. New York, USA: Author.

The University of Virginia health System (2012). Retrieved from http://www.hsl.virginia.edu/historical/medical_history/alav/tuberculosis.cfm.

Accessed on 12/6/2013

World Health Organization (2002). *Health and Sustainable Development*. Geneva, Switzerland: WHO Press.

World Health Organization (2005). *Health and Millennium Development Goals*. Geneva, Switzerland: WHO Press.

World Health Organization (2010). *Treatment of Tuberculosis Guidelines*. (4th Edition). Geneva, Switzerland: WHO Press.

World Health Organization (2012). *Global Tuberculosis report*. Geneva, Switzerland: WHO Press.