



The Effective Way to Prevent Occupational Hazards on Tuberculosis Treatment

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Authors' contributions

This work was carried out in collaboration among all authors. Author FCNM designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author ECO managed the analyses of the study. Author EOM managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Aim: The study aimed to monitor the effective ways to prevent the occupational hazards on tuberculosis (TB) treatment.

Methods: Multi-stage sampling procedure was used for this study.

Results: The findings of this study revealed that knowledge of occupational hazards of treatment and management of TB is not a new idea in Anambra state, however, majority of the respondents have low level knowledge of occupational hazards protection and prevention services available, particularly when it requires an improvement on the existing means of services.

Conclusion: Preventive and control measures to reduce the risk of TB infection and protection of health care workers should be given highest priority in health care planning and development.

Keywords: Tuberculosis; occupational hazards; treatment; protection; prevention.

1. INTRODUCTION

TB in all its forms is a major occupational hazard for healthcare workers (HCWs) worldwide. It may sound like a disease of the past, but TB, or TB, is still a real concern today in Nigeria, Mbaneme, et al. [1]. Moreover, as the old saying goes, an ounce of prevention is worth a pound of cure. More so, the best way to be well is to avoid getting sick in the first place.

Ministries of Health and their research institutes should develop new mechanisms to address determinants of TB to reduce the occupational hazards and the disease incidence. The transmission of strains of *Mycobacterium tuberculosis* occurs through infected droplets aerosolized by patients with active pulmonary TB. The transmission risk is highest when patients have unrecognized TB or are receiving inappropriate treatment, Dolin, et al. [2].

TB is primarily an airborne disease caused by *Mycobacterium tuberculosis*. The bacteria spread from person-to-person through the air (World Health Organization) [3]. This bacterium mainly affects the lungs, but may adversely affect other organs. TB is a curable disease. People who have the active TB disease in their lungs can release tiny particles containing M. Tb into the air by coughing, sneezing, laughing or singing. The air droplet nuclei are invisible to the naked eye. Droplet nuclei can remain airborne in a room temperature for many hours, until, they are removed by natural or mechanical ventilation (World Health Organization) [3]. TB is one of the commonest airborne diseases that are yet to identify as it were one of the leading causes of morbidity and mortality in Nigeria despite the fact that it is curable with adequate treatment.

According to Burkitt et al. [4], environmental and occupational medicine are uniquely wide-ranging medical specialties that consider the impacts of work and the environment on human health. Work is a major part of life. Virtually every patient seen in a clinic, office, or hospital has spent eight or more hours of almost every day and many months and years of life working [5]. In their jobs, people could be exposed to dangerous chemicals, hazardous physical agents, and emotional stress and trauma. Any of these exposures can cause disease, sometimes immediately and sometimes after an interval of years or decades. Study of these work-related

exposures and their effects constitutes the core of occupational medicine.

Any job has potential occupational hazards associated with it, whether in an air-conditioned office, in a construction company, or at a gate. Occupational hazards are unavoidable; therefore, everyone involved should have protection as much as possible. Although occupational risk cannot be eliminated, efforts to reduce the potential hazards is imperative, William [6]. TB control programmes focus on case identification and treatment. Therefore, opportunities to prevent the occupational hazard at onset are often over-looked hence, the effective way to prevent occupational hazard on treatment of TB [5]. The donor agencies and partners in TB programmes are investing billions of dollars annually to identify and treat individuals with active TB investing nothing on the hazard associated with treatment and working with patients of TB. New strategies are needed to prevent occupational hazard on treatment of TB to further reduce global incidence and mortality of TB and achieve the visionary goal of a TB-free world.

According to World Health Organization [7] The local government TB supervisor (LGTBS) coordinates TB control activities and oversees all the health facilities providing TB treatment services in each local government area. They are in charge of both public and private facilities that treats and cases of TB. They nominate both public and private health centers and laboratories for TB dot sites. LGTBS are patient trackers and counselors in management of TB. They preach adherence to TB medicine and administration to patients by treatment supporters and direct observation treatment strategy (DOTS). Thus, LGTBS are the largest cadre of dedicated TB control health workforce in Nigeria. The LGTBS is a link between the DOTs facilities, communities and the state TB control officer.

Health care workers in most TB Dot facilities are at high risk of becoming infected with TB (nosocomial transmission) especially when they have immuno-suppression. It is therefore very important to have active guidelines for Effective Way to Prevent Occupational Hazard on TB Treatment, and control in the context of LGTBS settings on issues of TB transmission. Preventive and control measures to reduce or prevent occupational hazard of TB infection and

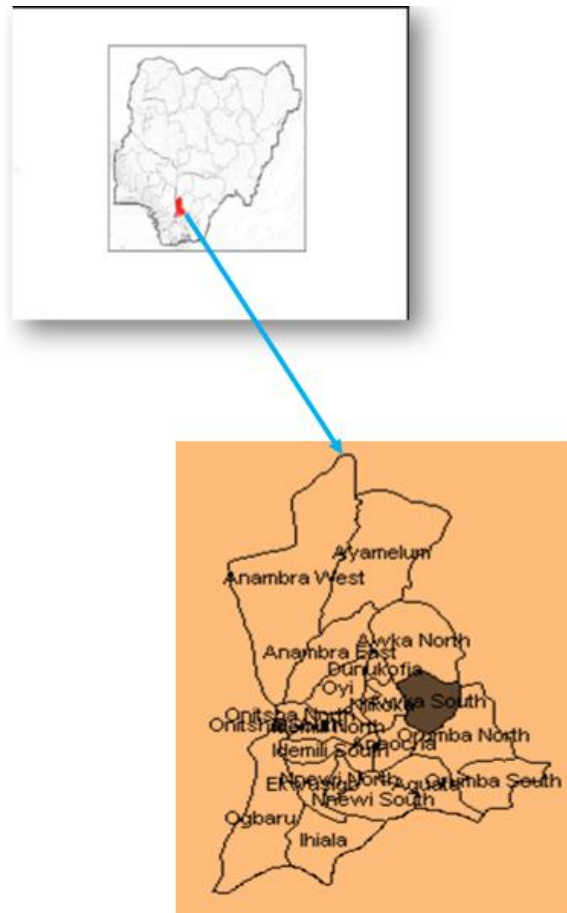


Fig. 1. Map of Nigeria showing Anambra State and 21 LGAs in the state

protection of LGTBS should be given highest priority in health care planning and development. TB prevention in health care settings for staff, guardians and other patients is very essential.

2. MATERIALS AND METHODS

The sample for the study consisted of fifteen Local Government TB, Leprosy and Buruli-ulcer Supervisors, twenty six health facilities each from the twenty one local government areas of the state and six members of the State Teams; six programme officers of Local Government Action on AIDs managers, and ten Local Government Disease Surveillance Officers. The ten percent of the programme officers were used as sample size, which are 583. Multi-stage sampling procedure was used for the study. In stage one, all the programme officers were clustered into five groups representing the five programmes. In stage two, all the programmes were listed, three were randomly drawn using simple random

sampling technique by balloting with replacement. In stage three, male and female respondents were chosen from each of the three programmes. Non-probability chance selection was used in selecting the persons. At the end, 583 respondents were selected and used for the study. The instrument used for data collection was structured interview Protocol. The researcher following review of related literature and personal experiences developed the instrument. Structured interview was used because some of the respondents were reluctant to respond.

The interview protocol was in four sections. Section "A" contained three questions on background information of the respondents. Section "B" contained ten questions on modes of prevention of TB Section "C" contained ten questions on the application of Tb prevention in treatment of TB. Section "D" contained ten questions on Use of Mechanical prevention application in the management of TB. All

questions are close-ended Five hundred and eight three copies of the structured interview protocol were distributed to male and female respondents in the five programmes by the researcher and trained research assistants. Distribution and collection of the instrument lasted for three weeks.

Data collected were analysed using descriptive statistics of frequency, percentage and grand mean as well as inferential statistics of chi-square. Percentages were used to answer the research questions while the null hypotheses were tested using χ^2 (chi-square) at 0.05 level of significance. Appropriate degrees of freedom were used.

3. RESULTS AND DISCUSSION

The socio economic characteristics of the respondents are present in the following figures. Fig. 2, shows the male accounted for 48% and 52% were female. The high percentage of the female is because of sampling of the entire programme officers without exempting any member of the programme. Fig. 3 shows the age range with the highest frequency is 41-50 years, which accounted for 40% of the respondents. 51 years and above accounted for seven percent. The average age in the study area is 41 years. This implies that respondents are in their active age and therefore can work to earn more income, which can affect their decision to take proper preventive measure of their health and their household health Mbaneme, et al. [1].

Fig. 4, shows that proportion of the married programme officers was 69%, which may therefore encourage the willingness to prevent oneself against TB infection that one may not infect members of their family.

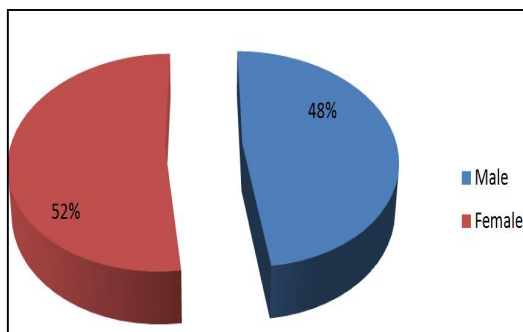


Fig. 2. Distribution of respondent's gender

Fig. 5 shows about 13% of the respondents represent those without formal education on occupational hazards while only 2% of the respondents had Tertiary education on occupational hazards. The mean year of education among the programme officers was 6 years. This revealed that a programme officer in the study area had at least six years of formal education on occupational hazard. Education on occupational hazards helps to enlighten the respondents on the need to keep our environment clean, free from germs and healthy for all.

Fig. 6, shows that the schedule of duty of the respondents revealed that 37%, 30%, and 22% engaged in Tb management, Aids management and disease surveillance respectively while only about 6 and 5% were health attendants and students respectively.

The general method of prevention i.e. the occupational hazards management of TB infection, its reliability as well as the frequency of treatment of TB are presented in Fig. 7.

Fig. 7, revealed that 32% of the respondents claimed that immune status of the exposed TBLS determines the rate of TB infection especially if the immunity is very low. On another hand, 23% of the respondents believe that the infectiousness of the person with TB determines the rate of its transmission to TBLS that meets or closer to the patient. However, 27% of this category indicated that it is the proximity; frequency and duration of exposure while eighteen percent of the respondents claimed that environmental factors determine the concentration of the Tb organisms in a given area.

Fig. 8, shows the frequency of level of awareness of route of discharging mycobacterium organisms (Bacilli) showed that 14% agreed that when affected person shouts, it discharges TB infectious organisms. About 24% of the respondents believed when affected person sneezes, it discharges TB infectious organisms. Twenty-three (23%) percent agreed that when affected person cough it discharges TB infectious organisms. In addition, 19% agreed that when affected person sings it discharges TB infectious organisms. Given this result, respondents are encouraged to cover their mouth and nose with facemask promptly and regularly when they attend to presumptive or conformed patient.

Fig. 9 depicts the level of awareness of the hazards of TB identification and the willingness to prevent its infection. The result revealed that 34% claimed that cough that last for two weeks or more with pain in the chest is one of the symptoms, 24% claimed that coughing up sputum or blood or bloodstain; 19% claimed that Fever and sweating at night; 12% claimed that weakness or fatigue and weight loss; no appetite and chills respectively. This is an indication that majority of the respondents are already aware of the symptoms of TB and can identify a TB patient.

Fig. 10 shows level of awareness of occupational hazards of TB based on the level of their education. The result showed that those respondents that attained university education were 41%; which means that their academic qualification enlightened them to be able to identify that all actions in Fig. 9 are TB signs and symptoms. Professional education, which is 23% of the respondents, believed that only a bad cough that last for two weeks or more with pain in the chest and coughing up sputum or blood or bloodstain is the symptoms. Those with non-formal education on occupational hazards and secondary education is 19% and 17% of the respondents respectively believe it is only a bad cough that last for two weeks or more with pain in the chest. Given the disadvantages that 40% of the study population are not fully aware of the occupational hazards associated with treatment and management of TB. This contribute to fact that most of the respondents in this category may be managing TB disease without willing to apply the protection and prevention treatment measures available at the Health facilities Mbaneme, et al. [1]. Thereby seeking medication where not necessary and at the same time receiving wrong treatment at the wrong place

[there is no significant relationship among respondents on their level of Education ($p < 0.05$).

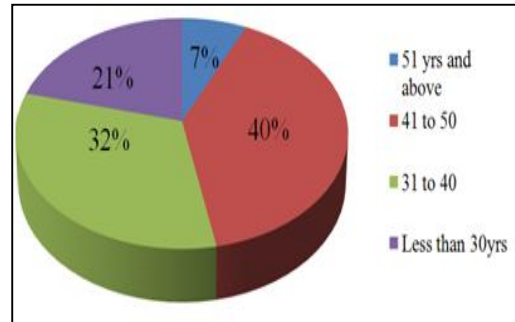


Fig. 3. The respondents' age distribution

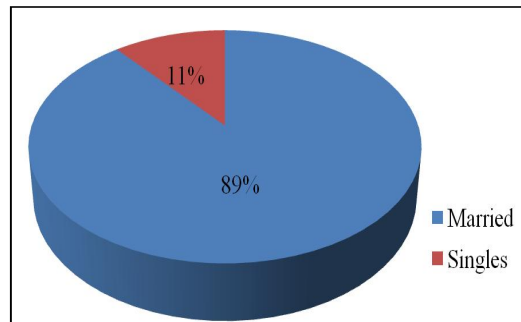


Fig. 4. The proportion of the married programme officers

Fig. 11 reveals the level of awareness of effective way to prevent occupational hazard on treatment and management of TB base on the respondent's gender and there is no significant relationship between male and female in their level of awareness of the occupational hazard on management of TB by $p < 0.05$. It shows that 6% male possessed high level of awareness of the

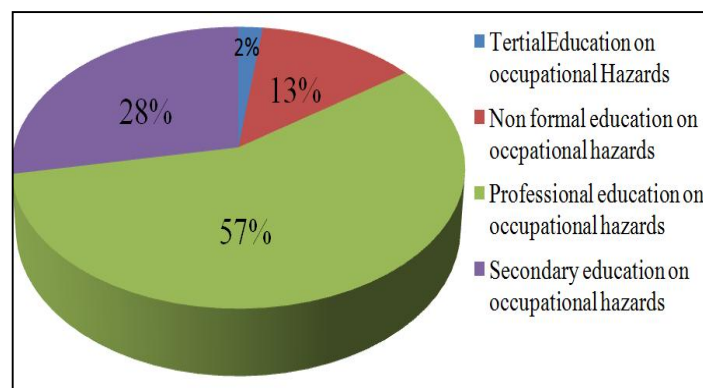


Fig. 5. The respondents' level of education

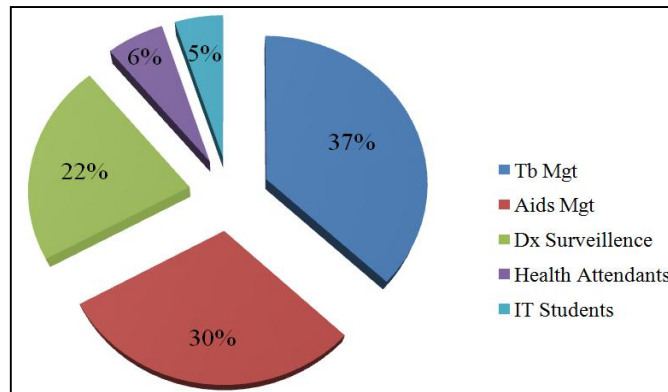


Fig. 6. The respondents' shedule of duty

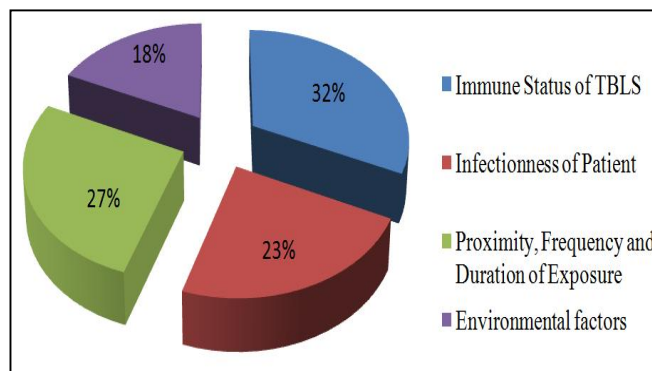


Fig. 7. Level of awareness of route of transmission of tuberculosis determines TBLS rate of infection

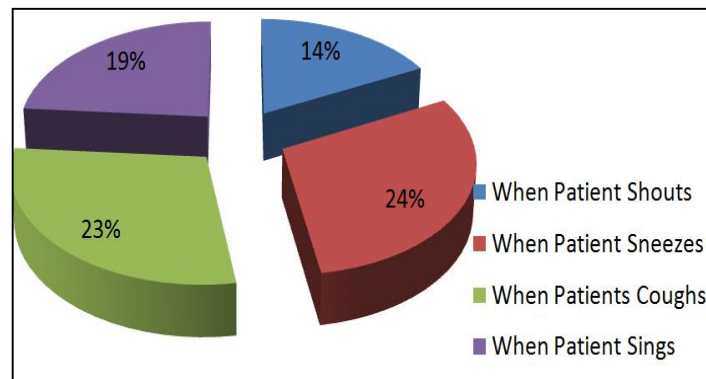


Fig. 8. Level of awareness of route of discharge of bacterial organism

occupational hazards, 8% possessed moderate level of awareness of the occupational hazards and 24% possessed low level of awareness occupational hazards based on their gender and the total percentage of male is 39%; 13% possessed high level awareness of the occupational hazard based on their gender. 15% possessed moderate level of awareness of the

occupational hazard. While 33% possessed low level of awareness of the occupational hazards and the total percentage of female is 61%. [There is no significant relationship among respondents gender in their level of awareness on effective way to prevent occupational hazard on treatment management of TB ($p>0.05$)].

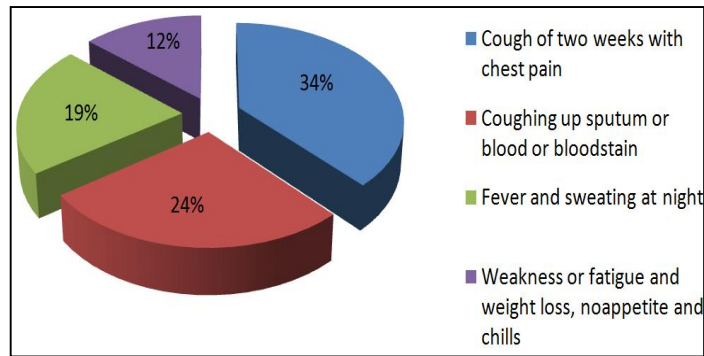


Fig. 9. Level of awareness of the hazards of tuberculosis identification and willingness to prevent its infection

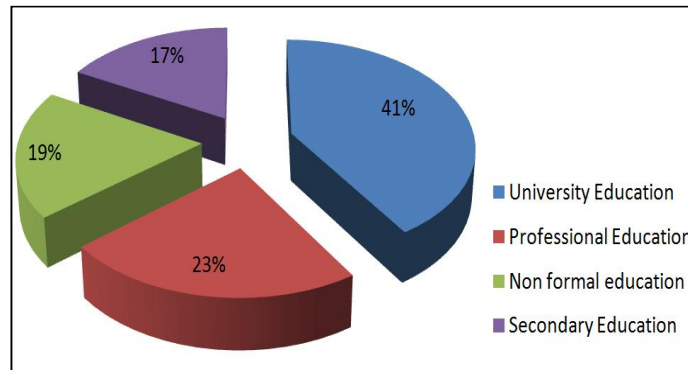


Fig. 10. Level of awareness of occupational hazards of tuberculosis base on level of education

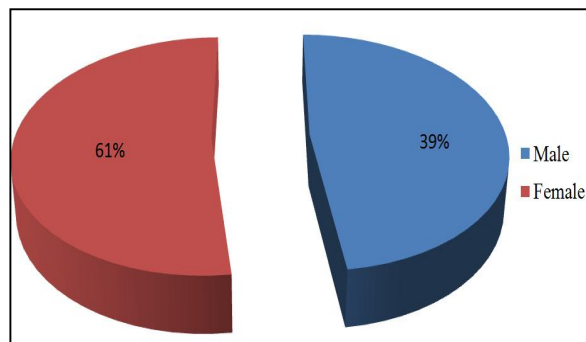


Fig. 11. Level of awareness of effective way to prevent occupational hazard on treatment and management of tuberculosis base on gender

4. CONCLUSION

This study revealed that knowledge of occupational hazards of treatment and management of TB is not a new idea in Anambra state, however, majority of the respondents have low level knowledge of occupational hazards protection and prevention services available,

particularly when it is going to be an improvement on the existing means of services. Sex, education and age distribution awareness of protection and prevention treatment measures of TB discovered to be determinants of household willingness for improved protection services in the local government area of the state.

Environmental controls are the second line of defense for preventing the spread of TB in health care settings. It is important to recognise that if work practice or administrative controls are inadequate, environmental controls will not eliminate the risk. Many environmental control measures (like filtration and ultraviolet irradiation) are technologically complex and expensive, Obionu, [8,9].

Health care staff should be mindful of the direction of airflow to ensure the patient is closest to the exhaust air and the staff is closest to the clean air source. Environmental Health Officer is the designated staff person to check on environmental control measures and maintain a log of monitoring and maintenance. Windows and doors should be checked on a daily basis to ensure they are in proper position.

Generally all windows and doors should be open when natural ventilation is the primary environmental control to allow for the free movement of air (e.g. across room from window to door or vice versa).

Instructions on cough hygiene Procedures to Patients who are found to be TB suspects or cases should immediately be informed about the importance of cough hygiene and advised to cover their mouth and nose with a hand when they cough or sneeze. Alternatively should be given face masks and wear while in the facility and disposal of used tissues or masks in identified no-touch receptacles and not on ground; No-touch receptacles for disposal of used tissues and masks should be available in the waiting areas. This special waiting area should have the highest natural ventilation possible, Stop TB Department, WHO [7]. The facemask is a falls false protective measure for the health care workers, other staff, patients, or visitors against TB. Rather, the moisture around the mouth and nose from breathing through these ordinary masks creates a favourable environment for bacteria including TB bacilli Kabra [10]. Therefore, it is not recommended that health care workers and other staff or visitors in TB care settings wear them. However, these masks may be useful in reducing release of bacteria from the patient to the environment. Hence, TB patients can use them.

5. RECOMMENDATION

Preventive and control measures to reduce the risk of TB infection and protection of health care

workers should be given highest priority in health care planning and development. Each facility should have a written TB infection prevention and control plan that outlines a protocol for the prompt recognition, separation, provision of services, investigation for TB and referral of patients with suspected or confirmed TB disease, Ebisike, et al. [11]. Early recognition of patients with suspected or confirmed TB disease is the first step in the arrangement. An Environmental health officer should be assigned to screen patients with a cough of two weeks or more immediately after they arrive at the facility. Patients with cough should be allowed to be registered without queuing with other patients, Stop TB Department, WHO [6].

It is therefore, recommended that programmes that will facilitate public awareness of occupational hazards associated with treatment and management of TB be initiated. Again, administrative and environmental prevention and protective measures were building into the health facilities. While health workers and local government TB supervisors should be reminded daily to reorganise and observe them on daily bases. In addition, to know that occupational hazards associated with treatment and management of TB patients are preventable [5]. Directly Observed Treatment strategy (DOTS), microscopic centers and TB care units created with every sense of safety in place. This will encourage effective way to prevent occupational hazard on TB treatment. In addition, public enlightenment campaign through mass media also adopted for proper information to the health workers and treatment supporters on the effective way to prevent occupational hazard on TB treatment at the private and government hospitals and health centers. More so, make the entire health workers observe the effective way to prevent occupational hazard on TB treatment, however, health workers should observe monthly routine investigation for early identification of safety defaulters. Health workers or community volunteers should be willing to observe and put into practice the effective way to prevent occupational hazard on TB treatment.

CONSENT

As per international standard, workers' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Mbaneme FCN, Mbaneme EO. Journal of Earth Sciences and Geotechnical Engineering. 2014;4(1):43-54. ISSN: 1792-9040 (print), 1792-9660 (online) Scienpress Ltd, 2014.
2. Dolin Gerald L Mandell, John E Bennett, Raphael. Mandell, Douglas and Bennett's principles and practice of infectious diseases (7th ed.). Philadelphia, PA: Churchill Livingstone/Elsevier. 2010;250. ISBN 978-0-443-06839-3.
3. World Health Organization. Tuberculosis fact sheet N°104"; 2010. (Retrieved 26 July 2011)
4. Burkitt H, George. Essential Surgery: Problems, Diagnosis & Management 4th ed. 2007;34. ISBN 9780443103452.
5. Mbaneme FCN, Mbaneme EO. illiterate effects and management of tuberculosis in the lower benue through of West African Sub-Region. Journal of Earth Sciences and Geotechnical Engineering. 2014;4(1): 43-54.
6. William NR. Environmental and occupational medicine 4th edition Departments of Medicine and of Environmental Medicine New York University School of Medicine New York; 2003.
7. Stop TB Department, WHO: Management of Tuberculosis Training for Health Facility Staff, Geneva; 2003.
8. Obionu CN. Guide to Tropical Public Health & Community Medicine. Nigeria: Ezu Books Publishers. 2018; 17 ISBN: 978-978-53904-7-6.
9. Schmidt BM, Engel ME, Abdullahi L, Ehrlich R. Effectiveness of control measures to prevent occupational tuberculosis infection in health care workers: A systematic review. BMC Public Health. 2018;18(1):661.
10. Kabra Vimlesh, Seth SK. Essentials of tuberculosis in children (3rd ed.). New Delhi: Jaypee Bros. Medical Publishers. 2006;249. ISBN 978-81-8061-709-6.
11. Ebisike AO, et al. In: The Sanitarian and His Work: A Practical Guide to Environmental Health Practice (First Edition) Jurainchrist Printers; 2009.

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