

# **Incidence of Tuberculosis in a Highly Urbanized City and Treatment Compliance to TB- DOTS Program**

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## **ABSTRACT**

Tuberculosis imposes a stigma not only to the patient but also to the community. Treatment of this disease needs patience as it may require extended period of treatment regimen. If not treated, tuberculosis can be fatal which can cause Multiple Drug Resistance (MDR). This study aimed to determine the incidence of tuberculosis in a highly urbanized city and its treatment compliance to DOTS Program. Descriptive – correlational research design with follow-up interviews were taken to determine the respondents' profile and the incidence of tuberculosis cases as well as the compliance of TB patients to DOTS. Respondents were identified using purposive sampling design. The study utilized the quantitative method using simple percentage, mode, median and Pearson R to establish the relationship of the factors in the study. Results showed that the majority of the respondents were males and in the young adult group of age ranging from 15-25 years old. The incidence of tuberculosis is high in 2011 (2.92%) while the cases

of TB in 2012 falls in the second rank with 50 cases (24.51%%). The incidence of TB decreased in 2008 (67%); and majority of the respondents were noted to be compliant to the prescribed treatment in the DOTS program. The study concludes that the incidence of tuberculosis cases is still increasing and uncontrolled, despite that the TB patients were compliant with the treatment regimen as implemented in the DOTS program of the Department of Health.

Keywords — Public Health, tuberculosis, DOTS program, descriptive-correlational design, Talisay City, Philippines

## INTRODUCTION

The need to have an extended treatment duration of the life-threatening illnesses such as tuberculosis is needed to lessen the increasing incidence of this disease. A high standard of care is vital to restore the health of individuals with tuberculosis, to prevent the disease in their families and to others, and to protect the health of communities (Migliori, Hopewell, Blasi, Spanevello & Raviglione, 2006).

Client's compliance to the treatment regimen is a concern to all health professionals in the community. Treatment for TB is not only a matter of individual health but also a substance of public health. All healthcare providers must have the knowledge to prescribe a standard treatment regimen and the means to assess adherence to ensure that the treatment was completed. It is a long-term process that should be initiated immediately upon suspicion of infection. The compliance to health regimen through prolonged treatment duration is necessary to ensure eradication of the organisms and to prevent relapse of the disease (Black & Hawks, 2008).

TB currently holds the seventh place in the global ranking of causes of death. There were current anti-TB drugs to treat such disease which were available for more than 50 years, but still in every 15 seconds, someone dies of tuberculosis. Even more alarming: a person is infected with *Mycobacterium tuberculosis* every second, every day. If left untreated, a person with active TB will contaminate an average of 10 to 15 other people every year (WHO, 2012).

Medication for tuberculosis is free of charge among the designated health centers nationwide, treatment partners have been part of the patient's success to compliance through monitoring. For some reasons, a number of PTB patients still fail to comply with the treatment regimen. The health center, particularly of

the Cebu City, contributed for non-compliance of some patients because of lack of constant monitoring among PTB patients and lack of motivation or drive.

The researchers with learning experience as clinical instructors have been affiliated and exposed to one of the communities. For this reason, the researchers observed an increasing incidence of tuberculosis cases in the area and saw the need that the Tuberculosis patients need an improvement specifically on the extent of compliance with the DOTS program. Through this study, the incidence of tuberculosis and treatment compliance to DOTS program in a village of a highly urbanized city will be determined, information will be gathered and correctly disseminated to the community. The relationship among patients and health personnel strengthened towards the success of treatment compliance. Hence, the findings of the study will be formulated as basis for a proposed action plan.

The gap in the knowledge is the latest evaluation on the effectiveness of the DOTS program at the health center levels especially in the urban areas of Central Visayas, Philippines.

## FRAMEWORK

This study was anchored on the concept of Rosenstock's Health Belief Model (1974). It is a psychological model that attempts to explain and predict health behaviors by focusing on the attitudes and beliefs of individuals. The key variables of the Health Belief Model are as follows: perceived threat, perceived benefits, perceived barriers and cues to action. Specific perception includes perceived threat or susceptibility and perceived seriousness that determines the total perceived threat of an illness to a precise one. Modifying factors include a person's perception to demographic variables, socio-psychological variables, structural variables and cues to action that can either be internal or external. Internal signs include feelings of fatigue, uncomfortable symptoms or thoughts about the condition of an ill person who is close. The likelihood of action depends on the perceived benefits of the action minus the perceived barriers to the act (Kozier et al., 2016).

Tuberculosis (TB) is an infectious disease caused by TB bacteria (*Mycobacterium tuberculosis*) that primarily affects the lungs. This condition is known as pulmonary tuberculosis (PTB). Patient may also have tuberculosis in the bones, meninges, joints, genital-urinary tract, liver, kidneys, intestines, and heart and this is called extra-pulmonary tuberculosis (Smeltzer, Bare, Hinkle & Cheever, 2008).

According to the WHO Report in 2010, the TB incidence should be falling by 2015. The Stop TB partnership has set two additional targets, which are to cut the rates of prevalence and mortality into half by 2015 compared with their levels in 1990. Collectively, the WHO's Stop TB strategy and the Stop TB Partnership's Global Plan to stop TB have set out how the 2015 targets can be achieved.

The estimates of the global burden of disease caused by TB in 2009 are as follows: 9.4 million incident cases, 14 million prevalent cases, 1.3 million deaths among HIV-negative people and 0.38 million deaths among HIV-positive people. Most cases were in the South- East Asia, African and Western Pacific regions. There were 5.8 million notified cases of TB in 2009 equivalent to a case detection rate (CDR, defined as the proportion of incident cases that were notified). Of the 2.6 million patients with the sputum smear-positive pulmonary TB in the 2008 cohort, 86% were successfully treated.

Among TB patients notified in 2009, an estimated 250,000 had multidrug resistant TB (MDR TB). Of these, slightly more than 30,000 (12%) were diagnosed with MDR-TB need to be rapidly expanded. Funding for TB control continued to increase and reached almost US \$5 billion in 2011. There is considerable variation in which countries spend on a per patient basis, and the extent to which the countries rely on domestic or external sources of funds, compared with the funding requirements as estimated in the Global Plan.

The incident rates are falling globally and in five of WHO's six regions. If these trends are sustained, the MDG target will be achieved. Reductions in the burden of disease achieved to date follow 15 years of intensive efforts to improve TB cases and control. Between 1995 and 2009, a total of 41 million TB patients were successfully treated in DOTS programmes and up to 6 million lives were saved including 2 million among women and children. Looking forward, the Stop TB Partnership launched an update version of the Global plan to Stop TB in 2010, for the year 2011-2015, intensified efforts are needed to plan, finance and implement the Stop TB strategy, according to the updated targets in this plan. This could have saved at least one million lives per year.

### **National TB Program**

The procedure followed by the treatment for tuberculosis as based on the National Tuberculosis Program of the Department of Health (2011) was established. First is the registration and initiation of cure. Informing the patient that he/she has PTB and motivate him/her to undergo treatment, a referral to a medical officer for pre-treatment evaluation and initiation of medication, open

the NTP (National Tuberculosis Control Program) treatment card and two NTP ID cards (one is for the treatment partner and the other is for the patient) as well as starting the treatment using any of the three treatment regimens: registering the patient in the NTP (National Tuberculosis Control Program) and to refer the patient to the most accessible BHS (Barangay Health Station) where he/she can have his/her treatment supervised.

Second is ensuring treatment compliance through “DOT” (Directly Observed Treatment). Together with the patient, identify a treatment partner; explain the importance of conducting compliance to the patient; administering the patient’s drugs daily. Emphasize the following to both the patient and the treatment partner. The treatment partner makes sure that the patient takes his/her drugs 2-3 hours after a regular meal daily. Treatment partner should make sure that the patient swallows his or her drugs daily. After intake of the drugs, the treatment partner checks and signs the treatment partner’s NTP (National Tuberculosis Control Program) ID Card as well as the patients NTP (National Tuberculosis Control Program) ID Card. The partner motivates treatment to be vigilant about patient’s treatment regimen.

The National Treatment Outcomes include the following: Cured, Completed, Treatment failure, Defaulter, Transfer out and Died (Migliori, Hopewell, Blasi, Spanevello & Raviglione, 2006). Motivation, by comparison, is a precursor to action that is indirectly measured through behavioral consequences or result. Commitment or attachment to a regimen is known as adherence, which may be long-lasting.

Today, Directly Observed Treatment Short Course (DOTS) still has many woes to share. Directly Observed Treatment for eight months often hinders complete treatment and reduces compliance due to inaccessibility of health services.

The above- mentioned theories, related concepts and studies presented were used by the researchers to obtain an in-depth understanding of the variable studied. They were viewed significantly regarding analyzing and interpreting results which would be the basis for the formulation of the proposed action plan.

## **OBJECTIVES OF THE STUDY**

The study aimed to determine the incidence of tuberculosis in a highly urbanized city and its treatment compliance to TB-DOTS program.

## METHODOLOGY

The study utilized the quantitative method using simple percentage, mode and median and the Pearson R results of the research specifically the descriptive-correlational research design. The researchers had retrieved the records of Tuberculosis cases from the year 2008-2012 for the incidence of tuberculosis cases in the village of a highly urbanized City which included the profile of the respondents regarding age, gender, zone, source of patient, category and treatment outcome of the patients. A researcher-made instrument adapted from the procedure manual of the National Tuberculosis Program of the Department of Health was created measuring the level of compliance of tuberculosis patients in the year 2012 to DOTS program of the Department of Health based on the evaluation of the Health Worker. The level of compliance was done on a 4-point Likert scale from (4) as Highly compliant to (1) as not compliant.

The researchers ensured that respondents understood the nature and purpose of the study and they were made to sign the informed consent after the orientation and guaranteed the privacy and confidentiality of the study. The research used the purposive sampling method. The respondents were the forty-seven (47) tuberculosis patients of the year 2012 who were evaluated by the community health workers in their treatment compliance in the DOH program. These patients had completed, failed, defaulted and had on-going treatment for the DOTS (Directly Observed Treatment Short Course) program of the Department of Health. Excluded in the research were the cured, dead and those who failed as trans-out patients. The profile of the respondents from the year 2008-2012 was also determined. The data were collected, analyzed and interpreted using descriptive statistical treatment.

The proponents obtained authorization to conduct the study from the Provincial Health Officer of Cebu City to determine the TB cases. A transmittal Letter was sent to the chairman of the village for permission to retrieve the data of their records on prevalence and compliance of tuberculosis patients of the treatment program and for the actual data collection.

## RESULTS AND DISCUSSION

Age, Sex, Origin, Source of Healthcare assistance, category, occupation and treatment outcomes of the respondents in 2012

The results showed that majority of the respondents were 15- 25 years old with 36.2 percent of the total TB cases in 2012. The least number of respondents are between 71-81 years old. This is consistent with the previous studies on TB cases wherein 80 percent were afflicted of TB in 2006 in the Philippines according to DOH. Their most productive years sent many independent families into poverty and, thus, has economic repercussions to the country in general (Lewis, 2007).

Males have the higher cases of tuberculosis in the year 2012 with 30 cases (63.8%) out of 47 cases with the exclusion of cured patients, while only 17 females (36.2%) have been registered with the DOTS program in 2012. This finding is also similar to the study done in Vietnam in 2006 where there was an increase in TB cases among men. It is due to the lifestyle of men, particularly the young men from ages 15 to 35. At this age, men tend to involve themselves with vices such as smoking, illegal drugs, and alcoholic beverages. Here in the Philippines, it is also considered rude to refuse a drink when somebody invited you to drink and usually use one glass to be passed on in circles from one person to the other, unaware and even ignoring the fact that these unhealthy and unsanitary practices can endanger their health and predispose them to disease such as tuberculosis among others. There is a higher incidence of TB cases among men as compared to women and is linked to lifestyle such as alcohol consumption and cigarette smoking (Rochelle, Yeung, Bond, & Li, 2014; Jee, Golub, Jo, Park, Ohrr & Samet, 2009).

Most of them came from the village of Laray with 14 cases (29.8 %). This implies that areas with poor sanitation and greater population have the higher risk of spreading the mycobacterium tuberculosis bacteria (Assam, et.al, 2013) since this disease is airborne in nature and can easily spread from one person to another in congested places.

The respondents are coming from public institutions such as health centers and public hospitals. Hence, from the data, it can be deduced that most of the clients are coming from low socioeconomic status since they all opted to consult public health institutions concerning their health problems and concerns about their free health consultations and services. As mentioned in the study of Santos, Vendramini, Gazetta, Oliveira, and Villa (2007), there is a correlation between incidence of TB and low socio economic status wherein TB incidence among the poorest areas.

All the patients belonged to category 1, which applies to new pulmonary tuberculosis patients with positive sputum results, extremely ill patients with severe forms of smear-negative pulmonary tuberculosis with extensive parenchymal

involvement or any extra pulmonary tuberculosis. According to Jones-Lopez et al. (2015), having cough more than 2 weeks is a symptom of tuberculosis. The data are also consistent with the researchers' observation that most of the Filipino patients, due to financial incapability to seek medical attention, tend to deal with their health problems on their own and ignore cough, colds, and fever that lasted for more than one week.

Out of 47 respondents, 12 (25.5%) are fishermen as their present job. The employment status of the patients were related to their educational attainment wherein if one lacks the adequate education, knowledge and skills in life, a person has the tendency to lack the chances of landing in a professional career and good paying jobs, hence, the average monthly family income of the respondents is also below minimum wage which can be considered at the poverty level. This is supported by Strauss (2011) that income is related to educational qualifications.

Only 6 out of 47 respondents (12.8%) belonged to the treatment outcome under completed medications; the rest still had ongoing medications with 41 (87.2%). The program of the government gave free medicines to TB patients. Most of the patients tend to complete their treatments since the drugs are given for free. However, some of the patients still did not comply with the treatment regimen. They tend to discontinue their treatment and will not be able to go back to the health center for consultation and evaluations. This attitude maybe attributed to hopelessness and lack of education and slow socioeconomic standing.

### **Incidence of Tuberculosis Patients in 2008-2012**

Table 1 shows the total number of TB patients registered in the DOTS program from 2008 to 2012 in San Roque, Talisay City, Philippines without the exclusion criteria which totalled to 204 and the incidence of TB patients in the village that excludes those who are cured and died from the treatment. It also shows the percentage of TB cases and as compared to the total number of tuberculosis patients living in the same local community in that particular year from 2008 to 2012.

Table 1. Incidence of Tuberculosis Patients from 2008-2012

Year	Total Population	No. of TB Patients in the village	Incidence Rate of TB patients in the village	Percent (%) of TB cases over Total No. of TB cases
2008	16,800	28	1.67	13.72%
2009	18,133	40	2.21	19.61%
2010	18,300	32	1.74	15.68%
2011	18,500	54	2.92	26.47%
2012	19,718	50	2.54	24.51%
Total	91,451	204	11.08	100%

Results revealed that there is still increasing incidence with 15-20% of Tuberculosis cases in the community for five years (2008-2012). These findings are relevantly similar to the situations in the global statistics wherein according to the records of the Center for Disease Control in 2011; there were estimated 8.7 million new cases of PTB and 1.4 million people who died from TB.

According to the article by Hopewell in 2006, tuberculosis is a treatable disease, yet one - third of the world's population is infected with *Mycobacterium tuberculosis*. The number of tuberculosis cases that occur in the world each year is still growing, although the rate of increase is slowing down.

With the findings, it clearly shows that TB is a serious disease and indeed, is alarming. It should be treated and need to be addressed sooner. The program needs to be improved so that the incidence will decrease.

Table 2. Treatment Compliance to the DOTS program among tuberculosis patients in the year 2012

Questions	Weighted Mean	Interpretation
The client complied with the health promotion activities by:		
1. registering basing from TB symptomatic Masterlist.	3.94	Very Compliant
2. undergoing sputum smear.	3.22	Compliant
3. encouraging the household members to undergo sputum examination.	1.81	Less Compliant
4. having been supervised by midwife or BHW during sputum collection.	3.66	Very Compliant
5. observing contamination precaution during sputum collection.	3.15	Compliant
6. having a medical officer evaluate after the sputum analysis.	3.68	Very Compliant
7. undergoing pre-treatment evaluation.	3.53	Very Compliant
8. taking medication daily.	2.55	Compliant
9. meeting with treatment partner everyday.	3.53	Very Compliant
10. meeting with treatment partner to make sure that patient swallow drugs daily.	3.53	Very Compliant
11. letting treatment partner check for NTP ID card.	3.53	Very Compliant
12. letting treatment partner sign for NTP ID card.	3.53	Very Compliant
13. having treatment at home during Saturday and supervised by a family member.	3.55	Very Compliant
14. having regular motivation from treatment partner.	2.50	Compliant
15. taking the drugs for prescribed duration.	3.66	Very Compliant
16. reporting any adverse reactions to drugs.	3.49	Very Compliant
17. undergoing follow-up sputum examination on specified dates.	2.38	Compliant
18. having regular consultation with treatment partner for treatment evaluation at BHS or RHU.	3.45	Very Compliant
19. having my treatment partner to monitor patient if he/ she fails to report the day expected for treatment.	2.57	Compliant
20. having treatment partner monitor patient for response to treatment.	3.44	Very Compliant
Total	3.23	Compliant

Study of the compliance of the DOTS program was undertaken only in 2012 because it utilize the data of patients undergoing DOTS program. Results revealed a 3.23 as the whole weighted mean of all the treatment compliance among TB patients in the year 2012. It also revealed a 3.94 result as the highest weighted mean of all the treatment compliance among PTB patients in 2012 which means that they are very compliant to the first step in the procedure on the National Tuberculosis Program of the Department of Health based on the TB symptomatic masterlist. It showed that the health center followed the first step as initiated in the NTP and that the patients been recognized as patients which is very vital before starting the treatment so that the patients will be monitored well and motivated in complying the treatments.

The other findings also revealed that they are very compliant to the second step which is ensuring treatment compliance through DOT (Directly Observed Treatment) together with the patient. The results showed that they are very compliant regarding treatment regimen along with the treatment partner, ensuring that the patient takes the drugs by making sure he or she swallows it and also by checking and signing the NTP card of the patient as well as the NTP card of the treatment partner. However, a finding revealed a 2.55 weighted mean for taking medications daily which means that they are compliant to this. This result shows that some patients were not compliant on taking medications daily since the drugs were taken on a weekly basis, so the adherence of taking medications daily was not followed by other patients. Motivation, by comparison, is a precursor to action that could be indirectly measured through behavioral consequences or result.

On the other hand, the lowest weighted mean revealed a 1.81 which means that they are less compliant with encouraging household members to undergo sputum examination. The success in Treatment Compliance is related to success in Treatment outcome of TB. Undergoing sputum check-up is important not only as a means of ensuring the effectiveness of the therapy, but as well as detecting other people who were exposed to tuberculosis and probably might need treatment as well since tuberculosis was transmitted through an airborne transmission. Adherence to treatment is the critical factor in determining the successful treatment. Achieving adherence is not an easy task, either for the patient or the provider.

**Table 3. Relationship between the Treatment Compliance to DOTS and Profile of the PTB Patients**

Variables	Computed Value	Decision	Interpretation
Present Job versus treatment compliance	0.0977	Reject Ho	Significant

The result showed that there is no significant relationship between the patients’ profile concerning their age, gender, community zones, the source of patients, categories of patients and the treatment outcome versus the patients’ compliance to DOTS program. However, there is a significant relationship of the present job and the extent of compliance with the treatment program of the Department of Health. The findings show that one adherence to treatment is affected by one of its factors which is social or economic profile such as lack of effective social support networks and unstable living circumstances.

### **CONCLUSION**

The researchers concluded that the incidence of tuberculosis cases is still increasing and uncontrolled, and the tuberculosis patients were compliant with the treatment regimen as implemented in the DOTS program of the Department of Health. The perceived barrier component of Rosenstock’s Health Belief Model (1974) had strengthened the study wherein there were different factors that affect the manner of treatment compliance of the patients. Patients needed to be motivated to enhance treatment compliance.

### **TRANSLATIONAL RESEARCH**

The findings of the study were translated to brochures and posters for information dissemination to the different health centers and the Department of Health to enhance their awareness campaign about tuberculosis. Provision of the health program as part of education of community and as well as to conduct research studies related to the evaluation of the health programs given by the government to the communities were also done. An action plan was implemented such as increasing the knowledge of patients regarding TB through extensive health teaching, continuation of the updated DOTS program with collaboration of the health care team and assistance of patients’ healthy lifestyle.

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