Predictors of Patients' Adherence to Public – Private Mix Dots (PPMD) Treatment

John Carlo L. Divina
Talisay District Hospital

ABSTRACT

This study determines predictors of adherence to PPMD treatment. Grounded on Pender's health promotion model, the descriptive correlational method is used. Thirty five adherent and 35 non-adherent respondents are chosen through simple random sampling. A validated and reliable researcher-made tool is administered and processed using discriminant analysis of the SPSS version 16. This study finds out that quality of health services (b=0.476, p=0.007) directly influences while income (b=-0.381, p=0.030) and perceived social stigma (b=-0.376, p=0.032) both inversely affect adherence. Patients' adherence towards PPMD treatment is an interchange of the health care services, social and economic factors.

Keywords: *Medication Adherence, Tuberculosis, Chemotherapy*

INTRODUCTION

The Philippines remains to be 9th highest Tuberculosis-burden country worldwide with national figures ranking TB as the 6th leading cause of mortality and morbidity (Vianzon, et al., 2013; Department of Health, 2004). Having shown an average of 90% treatment success rate from 2003 to 2010, a viable solution to addressing this problem is the expansion of the Directly Observed Treatment Shortcourse (DOTS) Strategy. Partly, the Public-Private Mix DOTS (PPMD) is a key initiative to broaden the coverage of DOTS among the private sector and enhance their adherence to the program (Tuberculosis Clinical Practice Guidelines, 2006).

With these efforts, the average defaulter rate for the eight-year study period is 4.4% but some areas exceeded 7%, beyond the national benchmark of 5%. (Vianzon, et al., 2013; DOH, 2014). "Inconsistent drug intake leads to further morbidity, communicability and causes drug resistance and death (Raviglione et al., as cited by the ISTC, 2006). Data from the World Health Organization (2003) identified the interaction of five aspects that affect patient's adherence to anti-Tuberculosis chemotherapy. These are socio-economic factors, health systems/healthcare team factors, condition-related factors, therapy –related factors and patient-related factors.

Few studies have been conducted among adherent and defaulters where specific determinants for adherence have been identified, thus, the researcher

embarked on this study to identify which factors have bearing on patients' adherence to PPMD treatment, the paramount factor in ascertaining positive treatment outcome.

Review of Related Literature

This study is anchored on Nola J. Pender's Health Promotion Model. The latter recognizes that health-promoting behavior is significantly determined by both cognitive and perceptual factors (Tomey & Alligood, 2002). Individual characteristics and experiences are highlighted to possibly have subsequent effect on health actions by influencing beliefs, affects and initiating health-promoting behaviour, resulting in better health outcomes ("Nursing Theories", n.d.).

The PPMD is the strategy launched by the health department to engage the private sector in delivering the basic services of DOTS in their clinics, hospitals and other institutions. Each PPMD unit accepts referrals from the private sector and processes their patients based on the NTP manual of procedures. The results of the latter's diagnostics and recommended management are then forwarded to the referring healthcare physician for notification and treatment.

Progressive efforts in Tuberculosis control have been documented albeit hampered by poor treatment adherence which has produced serious human, economic and social repercussions (Raviglione et al., as cited by the ISTC, 2006). Local studies have identified poor treatment adherence by patients, poor follow-up of defaulters and non-

sustained regular health promotion campaign as gaps in the implementation of the National Tuberculosis Control Program (Duran, 2001; Pongan, 2007).

Non-adherent or lost-to-follow-up patients are those who have missed to take his medications for two months or longer. Adherence rates are better when treatment is curative rather preventive in nature. However, compliance was lower for maintenance medications of chronic diseases (Brannon et al., 2007). Di Matteo (2004) reported on a meta-analysis of more than 500 compliance studies covering a 50-year span, indicated that the average rates of non-adherence was 24.8%. Interestingly, the latter's analysis revealed that some chronic conditions including cancer and HIV showed higher adherence rates, whereas diabetes and pulmonary disease showed low compliance.

According to Munro et al., (2007), providers and patients consider the young, old and those without permanent residences as "high risk" for non-adherence. Poor compliance to prescribed treatment affects all age groups but the elderly are at increased risk due to existence of cognitive and functional deficits. Adherence is further compromised by multiple co-morbidities and complex medical regimen. Age-related modifications in pharmacokinetics and pharmacodynamics make this population even more susceptible to ill-effects of non-adherence.

Lukbin as cited by Boroy (2010) noted that lower level of income with lesser educational attainment, negatively affects health status, and connected with both limiting social networks. In a study

by Mishra et al., (2005), logistic regression analysis showed the risk of non-adherence to TB treatment was significantly associated with unemployment (odds ratio [OR] 9.2), low status occupation (OR 4.4), low annual income (OR 5.4), and cost of travel to the TB treatment facility (OR 3.0). Therefore, low socio-economic status (i.e. lack of money) is significantly associated with non-adherence to TB management.

Similar studies in Malaysia have also reported significant relationship between transportation problems and non-adherence. According to a study of O'Boyle et al., (2002), travel time and expenses affect compliance to TB DOTS management while another study conducted by Nainget al., (2001) revealed that non-intravenous drug user living with HIV who resided distant to their health facilities and were not supervised drug intake had statistically significant higher odds of being non-adherent.

Treatment adherence is also affected by the patient's belief which includes their confidence in the effectiveness of the treatment. In a study with Japanese hospital patients as cited by Brannon et al., (2007), it was indicated that intentional non-adherence was more likely among those who had a poor understanding of their medication's characteristics and little confidence in their prescribed treatment. Another study of McDonnell et al., (2001) revealed that belief in medication's efficacy and benefit was strongly correlated with intentions to adhere ($r = 0.83$, $p < 0.001$), and interpersonal aspects of care was significantly correlated with perceptions of medication utility ($r = 0.65$, $p < 0.001$).

Client's satisfaction with the health care provider is regarded to be a vital predictor of adherence (Lewin et al., 2001 as cited by WHO, 2003), but emphatic relationships are arduous to establish when health providers are not trained, exhausted, poorly supervised or unsupported in their duties, as evident in high TB burden countries (Steyn et al., as cited by WHO, 2003). Magnifying to economic disadvantage and social interruption for patients, which negatively influence adherence, are other health care related-factors like inconvenient clinic hours and prolonged waiting time (Klink, 1969, as cited by Munro, 2007).

A strong predictor of adherence includes the level of social support one receives from family and friends. This may be in terms of practical or emotional support. Constant reminders and physical assistance in complying prescribed treatment make up practical; while nurturing and empathy make up emotional support. Nevertheless, these types are equally important influences in treatment adherence. A study on self-determination and compliance of DOTS treatment pointed out that logistical issues that hinder compliance were lessened through establishing supportive relationships, providing enablers and improving education. Patients should not be blamed for non-compliance, since it is often an institutional problem which prevents easy access to health care services (George, 2008).

According to Gebremariam et al., (2010), stigma is a plausible impediment because it makes patients unwilling to perform supervised drug intake in clinics nearby resulting in non-disclosure of disease. A cross-sectional study by Mittal and Gupta (2011) revealed that non-adherence was mainly due to lack of time, awareness and medication's side-effects.

METHODOLOGY

This study utilizes the descriptive -correlational design. The respondents are categorized as either adherent (n=35), who are new Pulmonary TB cases above 14 years old and on maintenance phase of treatment through DOTS, or non-adherent (n=35) who are new Pulmonary TB cases registered from 2010-2013 aged above 14 years old, but halted treatment for at least two months. This study randomly selected respondents from all health centers of Mandaue City Health PPMD South District.

The researcher utilizes a researcher -made questionnaire based on the literature reviewed and TB Stigma scale developed by Van Rei, et al., (2008) with permission to use. The questionnaire was validated by two experts of the National TB Program, pilot tested and subjected through reliability testing with Cronbach's coefficient alpha of 0.82. The research instrument comprises three parts. Part I involves profiling in terms of age, educational attainment, income level, sputum smear status, accessibility, co-morbidity and perceived self-efficacy (i.e. perceived effectiveness of the treatment provided by the TB DOTS).

Part II involves a Likert scale on the quality of health services, perceived social support, perceived social stigma and motivation to treatment adherence. Part III consists a multiple-response table on the side-effects and adverse reactions to TB drugs.

After approval from heads of institutions, the researcher gathered data by two means. For adherent clients, the researcher acquired informed consent during supervised DOT. For non-adherent clients, the researcher closely coordinated with the health care staff in contacting the former. Once the patient is located or a feedback from the patient had been received, both parties set the date and time of meeting for the purpose of data collection. Then, a similar process of explaining the study, signing of consent form and accomplishing the research instrument were done. Code numbers were provided to ensure the respondent's anonymity and record's confidentiality. One limitation of this study is the small sample size due to difficulty in tracing defaulters.

The collected data are then gathered, analyzed, and interpreted through discriminant analysis which revealed the association of the thirteen selected determinants and identified which would affect clients' adherence. Wilk's lambda indicated the proportion of the variability that was not explained by the variable. In the computation of all statistical data, Statistical Package for Social Sciences (SPSS), version 16 was used.

RESULTS AND DISCUSSIONS

Table 1 presents the respondents' profile in terms of age, educational attainment, income, sputum smear status, accessibility, co-morbidity and perceived self-efficacy. It can be obtained from Table 1 that most respondents are young adults (adherent = 66%; non-adherent = 60%) and high school graduates (adherent = 46%; non-adherent = 31%). While all age groups are at risk of contracting Tuberculosis, it mostly affects young adults in their most productive years (WHO, 2013).

In terms of income, most respondents belong to the moderate income bracket. Majority are sputum smear negative and without any co-morbidity. It takes at least 10,000 organisms per milliliter of sputum to yield a positive smear. At concentrations less than a thousand organisms, the probability of identifying an acid-fast bacilli in a smear is less than 10% (Toman, 2004 as cited in ISTC, 2006). Co-morbidity interferes in continuing treatment or may compel a client to prioritize among disease conditions (Mach, 2001). On the other hand, most adherent respondents and non-adherent respondents have a very high perceived self-efficacy (60%; 57%), respectively, while less than 10% of the respondents perceive it to be slightly effective.

Table 1. Clients' Personal Demographic Profile

Predictors	Adherent (n=35)		Non-Adherent (n=35)	
	F	%	F	%
Age				
Adolescent (15-18)	4	11%	1	3%
Young Adult (19-40)	23	66%	21	60%
Middle Adult (41-65)	8	23%	12	34%
Elderly (66 - onwards)	0	0%	1	3%
Educational Attainment				
Elementary Level	2	6%	9	26%
Elementary Graduate	3	9%	1	3%
High School Level	6	17%	7	20%
High School Graduate	16	46%	11	31%
Vocational Level	1	3%	0	0%
College Level	3	9%	5	14%
College Graduate	4	11%	2	6%
Income				
Low (5,000 & below)	9	26%	10	29%
Moderate (5,001-20,000)	24	69%	16	46%
High(Above 20,000)	2	6%	9	26%
Smear Status				
Negative	27	77%	22	63%
Positive	8	23%	13	37%
Accessibility				
Accessible	33	94%	32	91%
Not Accessible	2	6%	3	9%
Co-morbidity				
With Co-Morbidity	3	9%	6	17%
Without Co-Morbidity	32	91%	29	83%
Perceived Self-Efficacy				
Slightly Effective	1	3%	2	6%
Moderately Effective	13	37%	13	37%
Very Effective	21	60%	20	57%

Most respondents find the TB DOTS Unit to be accessible, while more than 50% of the respondents perceive the treatment provided very effective.

Table 2. Clients' Socio-Psychological Profile

Predictors	Adherent (n=35) Mean	Non-Adherent(n=35) Mean
Perceived Quality of Health Services	**3.31**	3.09
Perceived Social Support	**3.26**	3.60
Perceived Social Stigma	**2.20**	2.49
Motivation to Treatment	**3.64**	3.69

The results show that both sets of similar respondents have average mean scores ($\bar{x}$ =3.31; $\bar{x}$ =3.09) on perceived quality of health services. The respondents consider the staff to be knowledgeable, skilled, caring and approachable. They are entertained and they need not miss work just to do directly observed treatment. For perceived social support, adherent respondents have an average mean scores ($\bar{x}$ =3.26), while non-adherent has high mean scores ($\bar{x}$ =3.26). Social support is considered high when all of the family members assist the patient in any way to achieve treatment success, while average support system is considered when only some family members assist in some ways possible. Social support may come from any person - family, relatives, friends or health workers and any form – monetary assistance, encouragement and reminder which aid in treatment adherence (George, 2008).

Adherent and non-adherent respondents both have low perceived social stigma ($\bar{x}$ =2.20; $\bar{x}$ =2.49), respectively. Low perceived social stigma indicates that the patient feels guilty and lonely of having tuberculosis. This reflects a feeling of hurt of how others react to their disease and in turn, isolates themselves by not attending to DOTS clinics.

The respondents have high level motivation to treatment adherence with mean scores of 3.64 (adherent) and 3.69 (non-adherent). A high level of motivation reflects the person's belief of the efficacy of the treatment and positive outlook of getting well, not infecting others and avoiding serious complications and optimizing level of functioning.

Table 3. Side-effects and Adverse Reactions to Anti-TB Treatment*

Predictors	Adherent (n=35)		Non-Adherent (n=35)	
	F	%	F	%
Side-effects				
Abdominal Discomfort	11	31%	8	23%
Arthralgia	8	23%	4	11%
Flu-like Symptoms	13	37%	8	23%
Peripheral Neuritis	5	14%	9	26%
Urine Discoloration	32	91%	28	80%
Adverse Reactions				
Absence of Urine	1	3%	2	6%
Allergy	7	20%	10	29%
Blurred Vision	5	14%	6	17%
Dyspnea	0	0%	1	3%
Jaundice	0	0%	5	14%
Palpitations	0	0%	1	3%
Shivering	0	0%	2	6%
Sleeplessness	1	3%	0	0%

multiple response table

In a multiple response table shown above, it reveals that the common side-effect for anti-TB treatment is urine discoloration. Table 3 depicts the respondents' multiple response to adverse reactions to the medications; the presence of allergy account to 20% for the adherent and 29% for the non-adherent cases. Interestingly, blurring of vision is also considered as one of the top adverse reaction to treatment. Multiple numbers of tablets including their associated drug toxicity and side-effects inhibit treatment adherence (WHO, 2003).

Table 4. Predictors that Influence and Its Relationship to Adherence

Predictors	Wilk's Lambda	p-Value	Coefficients	Relationship to Adherence
Age	0.965	0.123	0.476	
Educational Attainment	0.979	0.229	-0.381	
Income	0.932	0.030*	-0.376	INVERSE
Sputum Smear Status	0.976	0.198	-0.309	
Accessibility	0.997	0.648	-0.268	
Co-Morbidity	0.984	0.291	-0.226	
Self-Efficacy	0.998	0.684	-0.223	
Quality of Health Services	0.898	0.007*	0.208	DIRECT
Perceived Social Support	0.954	0.076	0.183	
Perceived Social Stigma	0.934	0.032*	0.180	INVERSE
Motivation	0.995	0.567	-0.099	
Side-Effects	0.984	0.298	-0.070	
Adverse Reactions	0.975	0.192	0.476	

Significant at p=0.05

The discriminant analysis results in Table 4 identifies that quality of health services (p=0.007), income (p=0.030) and perceived social stigma (p=0.032)

significantly correlate with adherence to PPMD treatment.

Perceived quality of health services directly influences adherence. Health services of a TB DOTS Unit may be included, but are not limited to the attitude and competence of the healthcare staff, the office hours, the locale and the privacy the center provides. Situational influences in the external environment, e.g. perceptions of options available, demand characteristics and aesthetic features of the environment in which a given behavior is proposed to take place, can increase or decrease commitment to or participation in health – promoting behavior such as adherence to a treatment regimen (Pender, 2006).

This finding is supported by a study of WHO (2003) which revealed that adherence to treatment can be affected by the clinical services and system, including flexible operating hours , availability of expertise and support system linkages. Magnifying to economic disadvantage and social interruption for patients, which negatively influence adherence, are other health care related-factors like inconvenient clinic hours and prolonged waiting time (Klink, 1969, as cited by Munro, 2007; Jaiswal et al., 2003).

Income which inversely influences adherence may be considered a deterrent due to its unavailability and lack of which makes it difficult for the patient to exhibit a positive behaviour such as adhering to a treatment program (Pender, 2006). Numerous researches have clearly implicate the lack of social, personal and economic resources to be the barriers to adherence (Nevarro, 2009 as cited by Naidoo et al., 2013; Mirsha et al., 2005). However, out-of-pocket expenses may not be an issue for those with high income level, but may constitute a problem for program providers, since patients may intentionally drop-out from the National TB Program, since they can well afford the cost of treatment, while at the same time, avoiding the hassle of constant follow-up to the TB DOTS Unit.

Perceived social stigma inversely influences adherence. This constitutes both a barrier and unfavorable environment where the behavior and adherence might occur. Stigma and consequent discrimination have a double impact on TB control. The study reveals that patients are afraid to be being singled out in their communities and of people spreading rumors about their condition. Excluding them from social events leads to isolation and poor follow-up. Most of the patients closely associate stigma and Tuberculosis because of their communicability. Hiding diagnosis of TB or disclosure to a few (i.e. family members) is common due to these unpleasant experiences and expected stigma.

Another impact caused by stigma and discrimination is emotionally making it more difficult for patients to continue with care because of their fear of being identified as being, or having been infected with TB. This hinders their access to services on a daily basis and can lead to increased transmission and serious symptoms (Baral et al., 2007). Social isolation of patients; both outside

the family where the person may be avoided by former friends and acquaintances, and inside the family where the patient may be forced to eat and sleep separately, is one principal effects in developing countries (Hurtig et al., 1999 as cited by Baral et al., 2007).

This isolation leads to poor follow-up in TB DOTS center especially where the patient can be seen or can be identified as seeking treatment for Tuberculosis. To some extent, it may likely affect either employment or prospects thereof, thus, adding another burden in adherence to treatment.

Wilk's Lambda Score

The Wilk's lambda results show that 66.70 % of the variation cannot be explained by this model at significant *p* value of 0.024. This may be attributed to the given available data of the population in the study area. Results can be generalized at medium effect of 0.3 subject to fixed alpha at 0.05 and power at 0.80. As a whole, based on this finding, the percentage is quite high, noting that majority of the independent variables do not have a significant relationship across groups of the dependent variables. Other cofounding variables not evaluated by this study may have bearing on adherence.

Table 5. Discriminant Analysis of Predictors

Variables	Coefficient
Age	-0.009
Educational Attainment	0.094
Income	0.000
Sputum Smear Status	-0.395
Accessibility	0.279
Co-Morbidity	0.106
Perceived Self-Efficacy	0.016
Quality of Health Services	2.139
Perceived Social Support	-0.563
Perceived Social Stigma	-0.242
Motivation	-0.966
Side-effects	0.057
Adverse Reactions	-0.451
(Constant)	-0.388

Table 6 presents the unstandardized coefficients which are used to create the discriminant function (equation). The likelihood that a patient is adherent can be summarized as follows: *Discriminant analysis coefficient function (D)* = income + (2.139 x quality of health services) + (-0.242 x perceived social stigma)) + -0.388.

The discriminant function stated above indicates the partial and unique contribution of each identified variable to

the discriminate function which has control for all other variables in the equation. Hence, this equation can help discriminate whether a patient with tuberculosis will be adherent or not. However, the model can only explain 33.29% of the time as reflected in the over-all Wilk's Lambda score.

CONCLUSION

Income and perceived social stigma are good screening parameters in assessing clients' adherence. Quality of health services should be considered when providing treatment since it is a good determinant of clients' likelihood of treatment adherence. It is recommended that the NTP managers need to develop an evaluation tool that the clients can use to evaluate provision of health services and be submitted for monitoring. The staff needs to assess intensively the patient's income level and perceived social stigma prior to initiation and while on treatment.

REFERENCES

Baral, C., Deepak, K., Newell, J. (2007). Causes of stigma and discrimination associated with tuberculosis in Nepal: a qualitative study. *BMC Public Health* 2007, 7:211 doi: 10.1186/ 1471-2458-7-21.

Brannon, L. et al, (2007). *Health psychology: an introduction to behaviour and health.* (6th edition). USA: Thomson Wadsworth.

Boroy, D. L. (2010). *Level of compliance of End Stage Renal Disease (ESRD) patients on hemodialysis.* Cebu Normal University.

Department of Health. (2004). *National tuberculosis control program manual of procedure.* Philippines: Department of Health.

Department of Health. (2014). *Philippine Plan of Action to Control TB.* Philippines: Department of Health. Retrieved from http://www.doh.gov. ph/sites/default/files/publications/Upda ted_PhilPACT_20132016_v080715.pd f (Accessed: September 10, 2016).

DiMatteo, MR. (2004). Variations in patient's adherence to medical recommendations: A quantitative review of 50 years of research, *Medical Care,* 42: 200-209.

Duran, JK. T. (2001). *DOTS: An approach in the treatment of Pulmonary Tuberculosis.* Cebu Normal University.

Feldman, R. S. (2008). *Understanding psychology* (8th edition). USA: McGraw Hill International.

Gebremariam, M., Bjune, G., Frich, J. (2010). Barriers and facilitators of adherence to TB treatment in patients on concomitant TB and HIV treatment: a qualitative study. Retrieved from http://www.biomed central.com/1471-2458/10/651.

George, L. J. (2008). Self-determination and compliance in directly observed therapy of tuberculosis treatment in the kingdom of lesotho. *Social Work in Health Care, 46*(4), 81. Retrieved from http://search.proquest.com/docview/21 0887195? accountid=141440.

Hurtig, A., Porter, J., Ogden, J. (1999). Tuberculosis control and directly

observed therapy from the public health/human rights perspective. *International Journal of Tuberulosis and Lung Disease* 1999, 3(7):553-560. Retrieved from http:// www.biomed central.com/1471-2458/7/211/#B28.

Jaiswal, A., Singh, V., Ogden, J. A., Porter, J. D. H., Sharma, P. P., Sarin, R., Arora, V. K. and Jain, R. C. (2003), Adherence to tuberculosis treatment: lessons from the urban setting of Delhi, India. *Tropical Medicine & International Health*, 8: 625–633. doi: 10.104 6/j.13653156.2003.01061.x.

Klink, W.B. (1969). *Problems of regimen compliance in tuberculosis treatment*. New York (NY): Columbia University.

Lukbin, I. M. (2002). *Chronic illness: Impact and interventions* (5th edition). USA: Jones and Bartlett Publishers.

Lewin, S. et al, (2001). Interventions for providers to promote a patient-centered approach in clinical consultations. Cochrane Database Systematic Reviews, CD003267.

Mach, A. (2001). *5050: Towards a TB-free future*. Geneva: World health Organization.

Mirsha, P., Hansen, E., Sabroe S., Kafle, K. (2005). Socio-economic status and adherence to tuberculosis treatment: a case-control study in a district of Nepal. Retrieved from http://www.ncbi.nlm. nih.gov/pubmed/16229225.

Munro, Salla et al, (2007). Patient adherence to Tuberculosis treatment: a systematic review of qualitative research. Retrieved from http://www.plosme dicine.org/article/info%3Adoi%2F10.1 371%2Fjournal.pmed.0040238.

Naidoo, P., Peltzer. K., Louw, et al, (2013). Predictors of tuberculosis (TB) and antiretroviral (ARV) medication non-adherence in public primary care patients in South Africa: a cross sectional study. *BMC Public Health*. 13:396. doi: 10.1186/1471-2458-13-396.

Naing, NN., D'Este, C., et al, (2001). Factors contributing to poor compliance with anti-TB treatment among tuberculosis patients. *Southeast Asian Journal of Tropical Medicine Public Health*. 32(2): 369-382. Retrived from http:// www.ncbi.nlm.nih.gov/pubmed/11556 591/.

Nevarro, V. (2009). What we mean by the social determinants of health. *International Journal of Health Services*.13(3):423–441.doi: 10.219 0/HS.39.3.a.

O'Boyle, SJ., Power, JJ. et al, (2002). Factors affecting patient compliance with anti-tuberculosis chemotherapy using the directly observed treatment, short-course strategy (DOTS). *International Journal of Lung Disease*. 6(4): 307-12. Retrieved from http://www.ncbi. nlm.nih.gov/pubmed/11936739/.

Pender, N. J. (2006). *Health promotion in nursing practice* (5th edition). Singapore: Pearson Education South Asia.

Pongan, B. G. (2007). *Directly Observed Treatment Shortcourse (DOTS) chemotherapy for Pulmonary Tuberculosis: CIPP model*. Cebu Normal University.

Raviglione M, Snider D, Kochi A. (1995). Global epidemiology of tuberculosis : Morbidity and mortality of a worldwide epidemic. *Journal of American Medical Association*, *273*:220-226. Publisher Full Text.

Steyn, M. et al, (1997). Communication with TB patients: A neglectful dimensions of effective treatment? *Curationis*, *20*:53-56.

Task Force on Tuberculosis, Philippine Practice Guidelines Group in Infectious Diseases. (2006). *Pulmonary Tuberculosis: clinical practice guidelines.* PPGG-ID Philippine Society for Microbiology and Infectious Diseases, Inc., Philippine College of Chest Physicians and Philippine Coalition Against Tuberculosis.

Toman K. (2004). *How many bacilli are present in a sputum specime found positive by smear microscopy? In: Frieden TR, ed. Toman's tuberculosis. Case detection, treatment and monitoring.* (2nd edition). Geneva: World Health Organization.

Tomey, A. M., Alligood, M. R. (2002). *Nursing theorists and their works* (5th edition). Singapore: Mosby.

Tuberculosis Coalition for Technical Assistance. (2006). *International standards for Tuberculosis care (ISTC).* The Hague: Tuberculosis Coalition for Technical Assistance.

Van Rie, A., Sengupta, S., Pungrassami, P., Balthip, Q., Choonuan, S., Kasetjaroen, Y., Strauss, R., Chongsuvivatwong, V. (2008). Measuring stigma associated with tuberculosis and HIV/AIDS in southern Thailand: exploratory and confirmatory factor analyses of two new scales. *Tropical Medicine & International Health, 13*(1), 21-30.

Vianzon R et al. The tuberculosis profile of the Philippines, 2003–2011: advancing DOTS and beyond. *Western Pacific Surveillance and Response Journal*, 2013, 4(2). doi:10.5365/wpsar.2012.3.4.022.

World Health Organization. (2003) Adherence to long-term therapies. Evidence for action. Geneva: *World Health Organization*.

World Health Organization (2013).Global tuberculosis report 2013: executive summary. Retrieved from http://www.who.int/tb/publications/global_report/gtbr12_ executivesummary.pdf.