FACTORS FOR TUBERCULOSIS TREATMENT RELAPSE AMONG PATIENTS PREVIOUSLY TAKING CATEGORY 1 STANDARD TUBERCULOSIS TREATMENT REGIMEN IN SELECTED MUNICIPALITIES OF ILOCOS SUR

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ABSTRACT

BACKGROUND: The low-income, high density housing neighbourhood may be considered among the reasons why the Philippines is one of the highest tuberculosis (TB) burden countries in the world.

OBJECTIVE: The study aimed to determine the factors for tuberculosis treatment relapse among patients aged 15 years old and above previously taking category 1 standard TB treatment regimen from January 2011- January 2016 in selected municipalities in the province of Ilocos Sur.

MATEIAL & METHOD: This study used the descriptive method and assisted interview with questionnaire checklist in gathering data and were analyzed using frequency and percentage distributions.

RESULTS: Findings revealed that, majority of the respondents are from Bantay, age bracket of 41-60 years old, male, married, high school Graduate, low income /no source of income, crowding, underweight, with cough for more than 2 weeks, two PTB treatments, 4-6 months treatment duration, smoking, alcohol drinking, living 0-3 km distance to RHU, children as treatment partner, monthly medication refill, missed medications, with emotional support and treatment by General Practitioner.

CONCLUSION: The study identified factors under socio-demographic, history of present illness, lifestyle practices, family history of TB, during PTB-dose treatment, and after TB-DOTS treatment in the development of Relapse. Elucidating factors associated with relapse helps TB control programs and clinical providers recognize those who have a greater risk to explore ways of minimizing those risks.

KEY-WORDS: Medical sciences, public health, tuberculosis, descriptive research, Philippines.

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INTRODUCTION:

The whole population of the Philippines is at risk to tuberculosis. Tuberculosis accounts to 92.3 million in 2010 with 33.4% aged between zero and 14 years, 62.3% in the working age group of 15–64 years, and 4.3% being 65 years and older (Vianzon et al).[1]

Tuberculosis is caused by a bacterium called *Mycobacterium tuberculosis* that has existed for millennia and remains a major global health problem. It causes ill-health in millions of people each year and in 2015, it was one of the top 10 causes of death worldwide. This is despite the fact that with a timely diagnosis and correct treatment, most people who develop TB disease can be cured. Tuberculosis is the sixth leading cause of morbidity and mortality in the Philippines; the country is ninth out of the 22 highest TB-burden countries in the world and has one of the highest burdens of multi-drug resistant TB. Directly observed treatment, short-course (DOTS) strategy for TB control commenced in 1997 and nationwide coverage was achieved in 2003(Vianzon et al., 2012). Standard tuberculosis (TB) treatment is highly efficacious, but curing TB requires long treatment duration and many drugs may lead to non-adherence to a full course of anti-TB treatment (Park et al., 2015).

The DOTS strategy has been promoted by the World Health Organization (WHO) as the first priority in tuberculosis (TB) control. Although the DOTS strategy has been implemented in 127 of 211 countries, only about 27% of the world's TB burden is estimated to be treated under this approach to TB control (Pachas et al).[3]

Patients with tuberculosis require retreatment if they fail, default or relapse following initial treatment success. Outcomes among patients receiving a standard World Health Organization Category II retreatment regimen are suboptimal, resulting in increased risk of morbidity, drug resistance, and transmission (Dooley et al).[4]

The vision for the post-2015 global tuberculosis strategy is "a world free of tuberculosis", expressed as "zero deaths, disease and suffering due to tuberculosis". The goal is to end the global tuberculosis epidemic. Addressing the challenges will require innovative, multi-sectoral, and integrated approaches and DOTS strategy strengthened public sector tuberculosis programs to tackle a large burden of disease. It aims to (1) achieve universal access to early detection and proper treatment of all patients with tuberculosis; (2) putting supportive health and social sector policies and systems in place to enable effective delivery of tuberculosis care and prevention; and (3) intensifying research to develop and apply new technologies, tools and approaches to enable eventual tuberculosis elimination (WHO End TB Strategy, 2014).[5]

One of the Sustainable Developmental Goals is to "Ensure healthy lives and

promote well-being for all at all ages" and tuberculosis is one of the targets. The language of "ending epidemics" is also now a prominent element of global health strategies developed by WHO and the Joint United Nations Program on HIV/AIDS (UNAIDS for the post-2015 era, including the End TB Strategy).

In 2012, in anticipation of the end of the eras of the MDGs and Stop TB Strategy, WHO's Global TB Program initiated the development of a post-2015 global TB strategy. Following 2 years of consultations, the proposed strategy was discussed at the 2014 World Health Assembly, where it was unanimously endorsed by all Member States. That strategy is now known as the End TB Strategy. It covers the period 2016–2035 and the overall goal is to "End the global TB epidemic", defined as around 10 new cases per 100 000 population per year. This is the level found in countries considered to have a low burden of TB in 2015. The End TB Strategy has three high-level, overarching indicators and related targets and milestones. The three indicators are: the number of TB deaths per year; the TB incidence rate per year; and the percentage of TB-affected households that experience catastrophic costs as a result of TB disease. The 2035 targets are a 95% reduction in TB deaths and a 90% reduction in the TB incidence rate, compared with levels in 2015. The 2030 targets are a 90% reduction in TB deaths and an 80% reduction in the TB incidence rate, compared with levels in 2015. The most immediate milestones, set for 2020, are a 35% reduction in TB deaths and a 20% reduction in the TB incidence rate, compared with levels in 2015. The Stop TB Partnership has developed a

Global Plan to End TB, 2016–2020, which focuses on the actions and funding needed to reach these 2020 milestones (WHO Global Tuberculosis Report, 2016).

STATEMENT OF THE PROBLEM

The World Health Organization's declaration of tuberculosis as a global public health emergency in 1993, launch of the (DOTS) strategy; inclusion of tuberculosis-related indicators in the Millennium Development Goals; development and implementation of the Stop TB Strategy that underpins the Global Plan to Stop TB 2006–2015 have all helped to accelerate the global expansion of tuberculosis care and control. The Philippines has achieved improvements in case detection and exceeded the target for treatment success despite numerous challenges, particularly in making services accessible in difficult geographic and socioeconomic settings. With the efforts made and incurred costs, still, the country needs to improve the services to offer to eradicate tuberculosis.

OBJECTIVES

TB treatment Relapse outcome is a serious public health concern. It is compelling to identify, and deal with factors determining relapse treatment outcome. Therefore, with the interplay of various factors, the study was aimed to determine pattern of relapse treatment outcome and associated underlying factors among the patients in Selected Municipalities of Ilocos Sur. Specifically, it sought to answer the profile of the respondents in terms of socio-demographic, history of present illness, lifestyle practices, family history of TB, factors during the course of PTB-dose

treatment and after the course of TB-DOTS Treatment. Also, it will be used to indirectly assess the TB control in the communities included in the study and also investigate on the associated factors leading to relapse in the treatment of tuberculosis.

RESEARCH QUESTIONS

1. Among 15 years old and above relapsed Category 1 TB patients, what are the risk factors to treatment relapse in selected municipalities of Ilocos Sur?
2. What are the profiles and demographics of the respondents?
3. What are the frequency and percentage distributions of the factors in patients with relapse who previously took the standard Category 1 treatment for TB?

SIGNIFICANCE OF THE STUDY

The findings of this study will redound to the benefit of society considering that tuberculosis remains a major global health problem and poses as one of the top ten causes of death nationwide and worldwide. The increasing number of cases that relapsed to TB regimen despite getting treatment justifies the need to research on the risk factors that leads to treatment relapse of patients from selected municipalities in Ilocos Sur. Health care professionals will be guided on how to approach tuberculosis patients that have the risk factors to relapse. For the researchers, the study will help uncover areas in treatments that other researchers were not yet able to explore. Thus a new approach may be arrived at. Also, the research will help to expand partnerships

with all care providers, civil society organizations and communities in the context of strengthening health systems. Ending the tuberculosis epidemic will require further expansion of the scope and reach of interventions for tuberculosis care and prevention and aid in the institution of systems and policies to create an enabling environment and share responsibilities. Our findings on this aggressive pursuit of research and innovation will promote development and use of new tools for tuberculosis care and prevention. It will also require a provision for revisiting and adjusting the new strategy based on progress and the extent to which agreed milestones and targets are being met.

Elucidating factors associated with relapse might help TB control programs and clinical providers recognize those patients with a history of TB who have a greater risk for TB relapse so that we can explore ways of minimizing those risks.

SCOPE AND DELIMITATIONS

This study focuses on identifying risk factors affecting relapse among fifteen years old (15 y/o) and above patients who were previous registered with pulmonary tuberculosis (CAT-1) on both sexes in selected Municipalities in Ilocos Sur namely: Caoayan, Bantay, Santa Catalina, San Vicente and Vigan City.

THEORETICAL FRAMEWORK

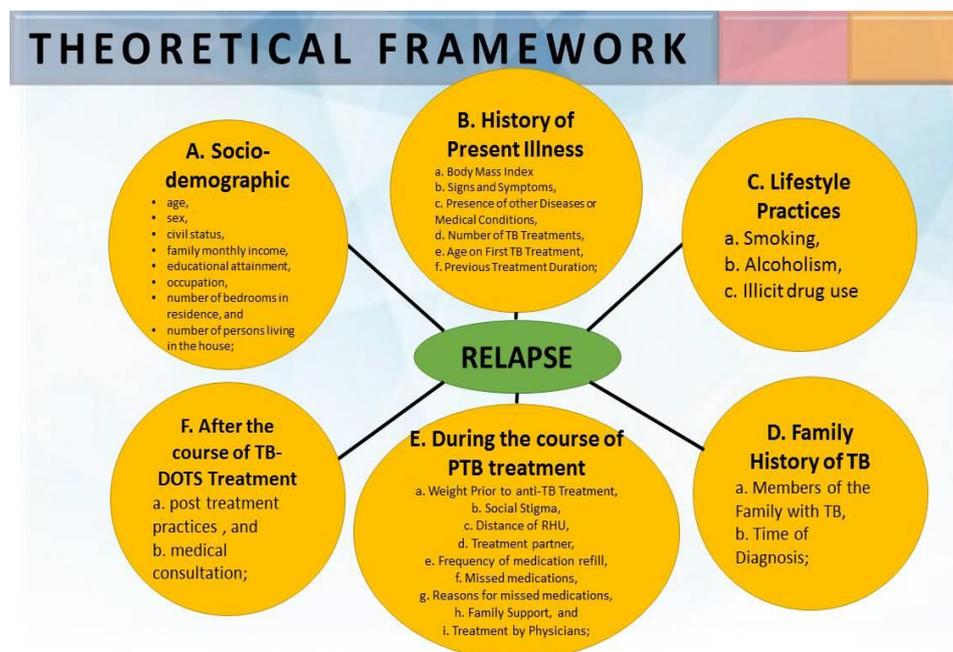The research paradigm which guided the researches in the conduct of this research is presented in Figure 1.

Figure 1
The Research Paradigm

The paradigm shows the relationship between the profiles of the respondents in terms of the patient-related factors affecting to the treatment outcome of the patients which is relapse. It also shows the aspects of patient-related factors that can influence the treatment outcome and these are: socio-demographic, lifestyle practices and the course of TB-DOTS treatment.

RESEARCH METHODOLOGY

SEARCH FOR LITERATURE. Data used in the review of related literature was identified through searches in PubMed. "TB relapse patient related factors" was used as the MeSH term giving results of 51 articles. The researchers reviewed all articles and journals not written in English and unrelated studies were eliminated. We also intended to scrutinize the bibliographies of the key studies to retrieve and identify other relevant articles and consulted experts in the field.

RESEARCH DESIGN. This study used the descriptive method of research. The group utilized a questionnaire and interviews in gathering data.

POPULATION AND SAMPLE. Total enumeration was employed among TB patients who relapsed in treatment from Selected Municipalities of Ilocos Sur recognized and recorded in the TB Registry of their respective municipal or city health office from January 2011-January 2016 duly validated in the Registry from the Provincial Health Office "2011-2016 Cohort Relapse of the National Tuberculosis Program."

LOCALE OF THE STUDY. This study was conducted in selected Municipalities of Ilocos Sur namely: Bantay, Caoayan, Santa Catalina, San Vicente and Vigan City.

Figure 2
Locale of the Study

The figure shows that Pilot Testing of the data gathering instrument used in the research study was conducted at Sto. Domingo, Ilocos Sur with 12 respondents. There were a total of 60 TB Relapse patient respondents who consented to participate in the study composed of 5 respondents from Caoayan, 5 from San Vicente, 11 from Santa Catalina, 18 from Vigan City and 21 respondents from Bantay.

SAMPLING DESIGN. This study made use of the descriptive method of research. There were seventy eight (78) TB patients registered as relapsed in the RHU's of the five municipalities and duly validated from the Provincial Health Office of Ilocos Sur "2011-2016 Cohort Relapse of the National Tuberculosis Program Data." However, the working population decreased due to five (5) deaths and two (2) who transferred out. That gave a total population of seventy one (71). Total enumeration was employed in gathering the needed data of this research.

DATA COLLECTION TECHNIQUE. The researchers utilized assisted interviews in gathering data. This was done in an assisted face-to-face interview that enabled the researchers to obtain precise and complete information from the respondents. There was also an opportunity for feedback, for probing complex questions and an opportunity to observe for non-verbal behaviors. Also, this offered a higher completion rate and high participation rate from respondents and non-literates were able to participate since they neither read nor write in providing the needed data.

DATA GATHERING INSTRUMENT. The research study used a questionnaire as a tool in gathering information from the respondents.

FORMULATION OF THE INSTRUMENT. A questionnaire-checklist was formulated accordingly based on the factors listed on research findings of the key studies seen in the review of related literatures.

TRANSLATION. The formulated English questionnaire was translated to the local dialect by the Gunglo Dagiti Mannurat nga Ilokano (GUMIL UNP- Chapter) under the University of Northern Philippines- Center for Ilokano Studies.

CONTENT VALIDATION OF THE QUESTIONNAIRE. All aspects of the tool was subjected for content validation of 4 experts (composed of two experts in research, one expert in community medicine and one expert in pulmonary medicine) who evaluated the tool in five criteria such as: a)Focus (all questions are directed on factors to TB Relapse), b) Clarity (all statements are simple and easily understood), c) Relevance (questions are within the topic), d) Conciseness (adequately short enough to read and understand targeted respondents) and ; e) Simplicity (terms used suits the level of the respondents). Each criterion was rated on a scale of 1-5 such that, 1(poor), 2 (fair), 3 (good), 4 (very good) and 5 (excellent). Comments and suggestions on the questions and structure of the questionnaire were taken from the validators or experts. All of their inputs were added in the formulation of the final layout of the data gathering instrument used in this research study. Results of the content validation were forwarded to the statistician for computation and determination on the acceptability of the data gathering instrument. The computed mean was 4.5 (90%), which means that the data gathering tool is between very good and excellent.

PILOT TESTING OF QUESTIONNAIRES. Pilot testing the formulated questionnaire ensured that all the questions were understood by the respondents and to ensure no problems with the wordings and measurements, content is acceptable in the local cultural context and check questions that make respondents feel uncomfortable. Also, this allowed the researchers to find out how long it takes to complete a single questionnaire in real time.

The pilot testing of the questionnaire for this research study was coordinated with the Municipal Mayor and Municipal Health Officer of Santo Domingo, Ilocos Sur and twelve (12) Tuberculosis Treatment Relapse subjects were recommended by the Rural Health Unit. The pilot testing of the questionnaire was done through door-to-door interviews, as endorsed by the Municipal Health Office of Sto. Domingo, Ilocos Sur, since gathering them in a single place for the conduct of the interviews can yield to low attendance. The researchers administered the questionnaire to each of the subject as planned. Comments and suggestions from the respondents were taken after each interview concerning on their understanding and acceptability of the questions. Also, the level of difficulty and the corresponding meaning of each question given to the respondents in the interview were also determined.

ETHICAL CONSIDERATIONS. In line with the purpose of research to broaden the body of knowledge, the researchers in this study are responsible in protecting the legal and moral rights of the human respondents. To safeguard these rights, the researchers applied for the proposal review with Application Number 0017 on February 20, 2017and was then approved by the University of Northern Philippines Research Center- Ethics Review

Committee basing from Philippine National Health Research System (PNHRS) Guidelines with Approval Number 0015 on March 7, 2017.

PRIVACY AND CONFIDENTIALITY. Confidentiality and anonymity of subjects was ensured to prevent the vulnerability of the information gathered from the subjects be disclosed. The data collected will be presented as an aggregate and will not jeopardize their access to government health centers subsequently. Anonymity of subjects and confidentiality in participation of the research study was held with high regards by means of using study codes on data documents such as in the completed questionnaire instead of recording identifying information and researchers will be keeping a separate document that links the study code to subjects' identifying information locked in a separate location and restrict access to this document only allowing primary investigators' access. The identity of the participants will not be revealed through the use of codes and all data and materials in the study will be placed in a locked file cabinet in the personal possession of the researchers. When no longer necessary for research, all materials will be destroyed.

INFORMED CONSENT. Informed consent was personally obtained from patients before the conduct of an assisted interview. Subjects were free to refuse to the participation of the research study without any consequences and their participation was voluntary. When they decided to be part in the research, they were asked to sign a consent form and are still free to withdraw at any time and without giving a reason whereas deciding not to take part in the research study will not affect the relationship of the respondent with the researchers.

VULNERABILITY. Despite the high vulnerability of the information from subjects will be disclosed, the researchers intended to use study codes as an effective method for protecting the confidentiality of research participants. Study codes were used in data collection instruments in place of identifying information to protect participants' responses. Also, in the event that a data document will be lost or stolen, having the data protected by a study codes will prevent anyone who may view the data from determining the participant's identity.

RECRUITMENT OF SUBJECTS. The respondents of this study were the patients previously taking TB Category 1 standard regimen who relapsed from treatment in Selected Municipalities of Ilocos Sur recognized and recorded in the TB Registry of their respective municipal or city health office from January 2011-January 2016 duly validated in the Registry of the Provincial Health Office "2011-2016 Cohort Relapse of the National Tuberculosis Program." To ensure validity of results of this research study and considering the working population, the researchers decided that there will be no sampling to be done and all of the seventy one (71) patients who were registered in the TB Registry with treatment outcome as relapsed be the subjects of the study and total enumeration was done. As the research study progressed, the working population with a total of seventy one (71), eleven (11) respondents refused to be part of this study giving sixty (60) working population.

CONSENT AND ASSENT. After a thorough explanation regarding the conduct of study, time was given for the subject to ask for questions. A voluntary and informed consent were obtained from subjects more than 18 years old whereas an assent was obtained from subjects less than 18 years old.

RISKS. In the gathering of data through an assisted interview there may be minimal risks that are not anticipated. However, every effort was made to minimize any risks. The questions included in the survey are not deemed to be sensitive, however as it is impossible to predict individual reactions, psychological support were provided. Interviewees were free not to answer any question posed or to stop the interview at any time without prejudice. The conduct of this study poses a risk to the researchers since tuberculosis is a communicable disease and respondents or subjects are tuberculosis relapse patients were interviewed face-to-face. The researches need to have a strong immunity prior to the set interviews. Also, to ensure safety and security of the researchers in doing the interviews, the plans were coordinated to the municipal and city mayors and proper endorsement was done to the municipal health offices and also to the officials in the different areas where the interviews were conducted. In case house to house was done to visit the respondents in their respective homes, the presence of any barangay official, barangay nutrition scholar or barangay health worker was requested to assist the researchers in the conduct of the activity.

BENEFITS. Findings on this aggressive pursuit of research and innovation will promote development and use of new tools for tuberculosis care and prevention. It will also require a provision for revisiting and adjusting the new strategy based on progress and the extent to which agreed milestones and targets are being met. Patients and their families will also benefit in this study since when factors will be identified in the development of treatment relapse, they will be knowledgeable in addressing them and they can intervene to attain successful treatment outcomes.

COMPENSATION. There is no monetary compensation for the respondents' participation in this study.

COMMUNITY CONSIDERATIONS. The findings of this study will redound to the benefit of society considering that tuberculosis remains a major global health problem and poses as one of the top ten causes of death nationwide and worldwide. The increasing number of cases that relapsed from standard TB treatment justifies the need to research on the risk factors that leads to treatment relapse in patients from selected municipalities in Ilocos Sur.

SPECIMEN HANDLING. The research study did not use any specimen and no harmful objects were handled.

DATA GATHERING PROCEDURES. Prior to conducting an interview, researchers formally requested permission from the Municipal or City Mayor thru their respective Municipal or City Health Officer to gather data information of the Relapsed patients from their "TB Registry" records from January 2011 - January 2016 with relapsed outcome cases. Data given by MHO/CHO were validated with the report from the Provincial Health

Office 2011-2016 Cohort Relapse of the "National Tuberculosis Program". The address of each respondent was obtained and visited for the conduct of an assisted interview. The research study commenced after obtaining the final review and approval of the University of Northern Philippines Ethics Review Committee. Informed Consent was obtained after thorough explanation of the background, purpose and objective of the study. Salient Parts of the informed consent was discussed like the study procedures, confidentiality, participation and withdrawal, risks, costs, compensation and feedback of the results. All information and responses from the sixty (60) samples were treated as confidential. All data was tallied, compared and the frequency and percentage counts were computed.

STATISTICAL TREATMENT OF DATA. The gathered data was statistically

The figure summarizes the activities conducted by the researchers which started with the selection of the topic, then, problem identification, review of related literatures, setting of objectives, formulation of hypothesis and problems, formulation of questionnaire including its translation, content validation by experts to come up with the final lay out. Also, the research was reviewed and approved by the ERC of UNP Research Center. Pilot testing and data gathering was done and finally, tallying of data, statistical treatment, analysis and dissemination of findings.
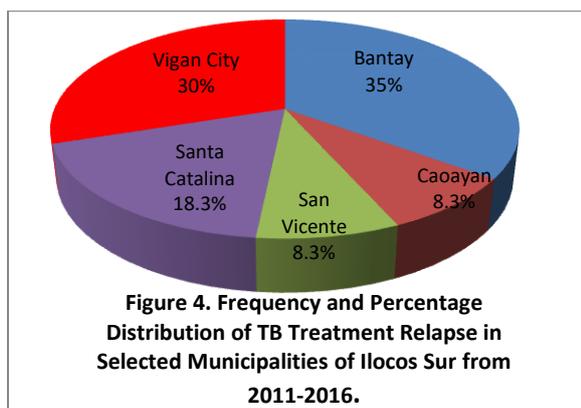
RESULTS & DISCUSSIONS:

A total of sixty patients on TB treatment relapse from the Selected Municipalities of

treated using IBM SPSS (Statistical Package for Social Sciences). Frequency and percentage counts were used to determine the profile of the patient respondents. Statistical Data was interpreted using the guidelines from the University of Northern Philippines Research Center.


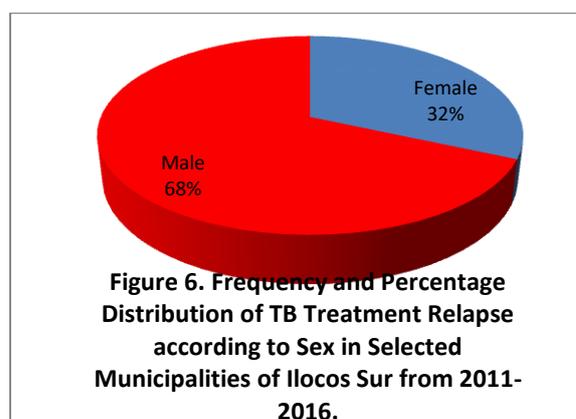**Figure 3: Schematic Flowchart of the Research Methodology**

Ilocos Sur, the municipality of Bantay has the highest number of relapse cases accounting to 35 % (21 patients) while Vigan City ranked as second with 30% (18 patients) then, the municipality of Santa Catalina ranked third with 18.3% (11) and the municipalities of San Vicente and Caoayan ranked fourth both with 8.3% (5). Bantay has the highest number of TB patients among the five municipalities due to extensive case finding strategies employed by the municipality.

Figure 4. Frequency and Percentage Distribution of TB Treatment Relapse in Selected Municipalities of Ilocos Sur from 2011-2016.

Figure 5. Frequency and Percentage Distribution of TB Treatment Relapse according to Age in Selected Municipalities of Ilocos Sur from 2011-2016
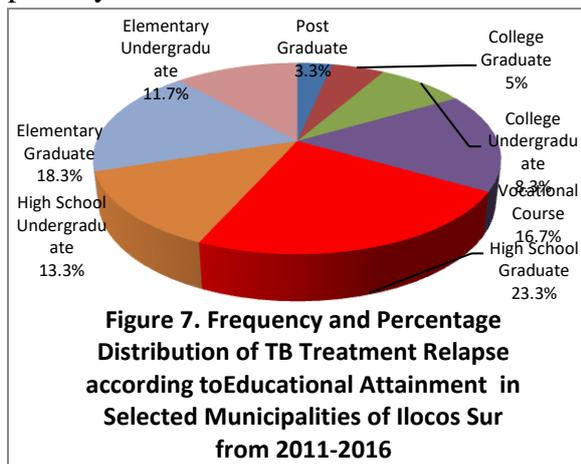
Majority of the relapse patients are aged 41-60 years old with 55.0% (33) and least among 21-40 years old with 8.3%(5) which is consistent with the findings of Lee et al., 2014 noting that relapse rate was highest among patients in their 40's – 60's and on the findings of Ade et al,[6] 2016 where relapse was predominantly of adults aged between 45 and 64 and with the study of Sarpal et al,[7] noting highest in age group 40-59 years. This tendency likely linked to other co-determinants such as poor treatment adherence, smoking, alcohol intake and co-existing morbidities. Basing and calculating on the age, more than ninety per cent of the respondents were born before the implementation of the Expanded Program on Immunization in 1979 which may lead to higher tendency for Tuberculosis infection and ultimately leading to relapse. Furthermore, individuals over 40 years of age have a greater number of associated comorbidities that require the use of other medications, which may predispose these individuals to the irregular intake of specific medications, enable drug resistance and higher risk for hepatotoxicity, thereby, decreasing the drug effectiveness due to impaired drug metabolism.
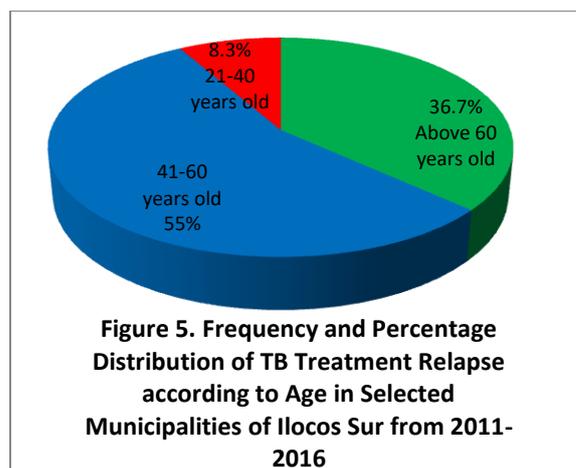
There were a significant number of males with 68.3% (41 patients) from the population developing to TB treatment relapse. This may be attributed to a reason where men are usually the head of households which explains the fewer adherences to treatment. A study conducted by Ramos, et al., 2015 found that being male and being employed implied twice the risk of abandoning treatment, mainly because workers have trouble in leaving their duties for health care center visits. Whereas, women have lesser chance for TB treatment relapse which may be a consequence of women having more contacts with the health services given that they usually take care of their children´s health.

Figure 6. Frequency and Percentage Distribution of TB Treatment Relapse according to Sex in Selected Municipalities of Ilocos Sur from 2011-2016.
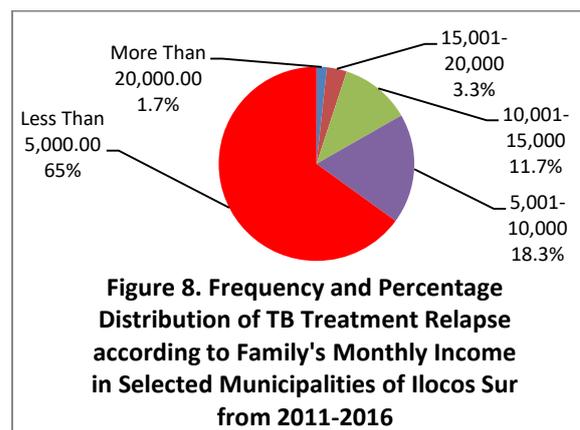
In this study, most of the respondents with 23.3% (14 patients) were high school graduates followed by 18.3% (11 patients) who were elementary graduates, 16.7% (10 patients) of them were Vocational graduates, whereas, 13.3% (8 patients) were High School undergraduates, 11.7% (7) were elementary Undergraduates, 8.3% (5 patients) were College Undergraduates, 5% (3 patients) were college graduates, 3.3% (2 patients) were Postgraduates. It can be noted that treatment relapse may be attributed to low educational attainment, as most patients could not understand their disease, lack the ability to read instructions and dosage regimen on the labels and also lack of knowledge on compliance to existing DOTS programme. This result supports the study of Ghafoor et al,[8] where 29.5% of their respondents received only primary education.

Figure 7. Frequency and Percentage Distribution of TB Treatment Relapse according toEducational Attainment in Selected Municipalities of Ilocos Sur from 2011-2016

For the family monthly income, 65% (39) have <5,000.00, 18.3% (11) have a monthly family income ranging from 5001Php-10000 Php, 11.7%(7) belonged within the range of 10,001-15,000, 3.3% (2) have 15,001.00-20,000.00 Php and 1.7% (1) has more than 20,000.00 Php. Considering the patient respondents, majority are in the age of 41-60 years old, also, majority finished only High School
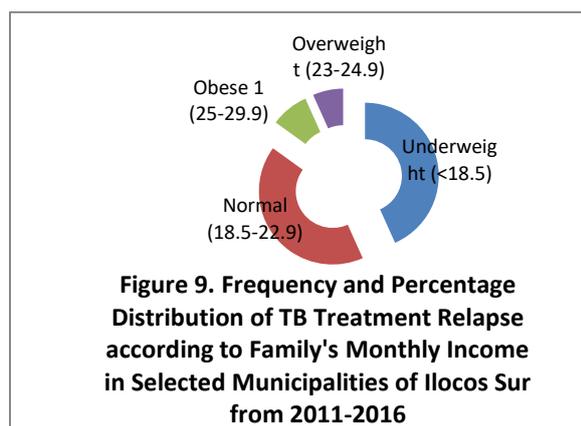
and in this environment where competition exist even in the point of job application, people under those given categories may result to placement in unstable nature of work. This may then lead to a very low income, as seen in this study, where majority of the respondents have no occupation or source of income accounting for 24 or 40%, 12 or 20% were farmers, 7 or 11.7% were manual workers or laborers which is consistent with that of the income of respondents earning less than 5,000.00 per month.

Figure 8. Frequency and Percentage Distribution of TB Treatment Relapse according to Family's Monthly Income in Selected Municipalities of Ilocos Sur from 2011-2016

As seen in the results, 26 or 43.3% of 60 respondents have 2 bedrooms in their residence and 30 or 53.4% of the population have 4-6 household members. One factor that can be deduced is crowding which entails poor air quality within homes as a result of inadequate ventilation, and the presence of molds and smoke contribute to poor respiratory health in general and have been implicated in the spread and/or poor outcome of tuberculosis (TB).

A great percentage of the respondents 43.33% are underweight as reflected with a Body Mass Index of less than 18.5 (Classification of Obesity as recommended

by Asia-pacific Task Force). According to Creswell et al., 2011, malnutrition is a cause of tuberculosis disease and wasting is a consequence of TB, which explains why a large proportion of TB patients are undernourished at the time of diagnosis. The ecological evidence linking declines in TB to better nutrition has long been clear. The negative impact of various macro- and micro-nutritional deficiencies on TB immunity was demonstrated although the exact biological pathways are not fully understood, it is clear that poor nutrition, and specifically protein deficiency, impedes the ability of the cell-mediated immune system to fight M. tuberculosis, as it does for other infections. Malnutrition is an important contributing factor to TB on a population level, especially in poor countries. Low BMI at the time of diagnosis has also been linked to risk of treatment failure, death during TB treatment and relapse.

Figure 9. Frequency and Percentage Distribution of TB Treatment Relapse according to Family's Monthly Income in Selected Municipalities of Ilocos Sur from 2011-2016

Majority of the TB relapse patients do not have associated or accompanying medical conditions with 60% (36), a finding supported by Creswell et al.[9] Cardiovascular diseases have links with TB, but they have not been documented as direct risk factors for TB, but rather, TB sequelae have been known to be a risk factor for cardiopulmonary failure. Other chronic conditions, such as autoimmune and systematic disorders, chronic renal failure, liver failure, certain malignancies and a wide range of immunosuppressant treatments, may also associated with TB. The causal relationship between DM and TB is likely, but further research is needed to verify results and to better document the strength of the association and the possible causal mechanisms.

Majority 49 (81.7%) of the patient-respondents underwent tuberculosis treatment twice, consistent to that of the populations of this study which is relapse. According to Picson et. al,[10] incomplete bacteriological cure which is usually caused by irregular medication intake, is the most common cause of endogenous reactivation. Endogenous reactivation can also result from the use of regimens with low bacterial potency, from inadequate treatment duration, from under dosage of the medication or from the inappropriate choice of medication.

A great number 26 (43.3%) had their first TB treatment at age 36-55 years old. According to Gadoev et. al,[11] the risk of recurrent TB was highest among older adults (36-55 years). This finding likely linked to other co-determinants such as poor treatment adherence, smoking, alcohol intake and co-existing morbidities. Increasing age has been one of the risk factors of many life style and non-communicable diseases that decreases the immune capacity of a person. Immuno-compromised state with the interplay of other factors leads to the acquisition of microorganisms thus causing development of diseases such as tuberculosis.

Majority 37 (61.7%) of the patients had taken their past TB treatment regimen for 4-6 months. The WHO recommends that treatment with pulmonary tuberculosis must be given for six months, daily or intermittently, through the DOTS strategy. World Health Organization found out that the 2-month rifampicin regimen (2HRZE/6HE) is associated with more relapses and deaths than the 6-month rifampicin regimen (2HRZE/4HR). According to Cox et. al,[12] it can be noted that one of the potential contributing factors to recurrent TB after successful treatment is the shorter total durations of treatment (particularly Rifampicin) which reflects patient's inadequate understanding of the DOTS strategy and the whole treatment process.

From a total of 60 relapse TB patient-respondents, 41 (68.3%) does not have any history of cigarette smoking while 19 patients out of 60 patients or 31.7% smoke. A small percentage of 15% or 9 out of 60 patients smoke 11-15 sticks per day and 5 (8.3%) had 16-20sticks per day. The biological explanation of the casual relationship between smoking, and tuberculosis infection and disease has been increasingly well documented. The tracheobronchial mucosal surface is a first level of host defense that prevents *M. tuberculosis* from reaching the alveoli. Tobacco and other environmental pollutants may impair this defense mechanism. Smoking also affects the chance of cure from TB since severity of TB at the time of diagnosis and risk of relapse has been linked to smoking. In addition, a few studies have found that smokers have a higher risk of death from TB and other poor treatment outcomes than non-smokers. A number of studies

from the UK and USA also found an independent association between COPD comorbidity and death in TB patients, although others found no effect. Problems controlling for the effects of smoking may be partially to blame for the lack of clear evidence. In addition, majority of the respondents do not smoke and this may be attributed to the low family monthly income of the respondents and the implementation of the Republic Act 10351, otherwise known as the Sin Tax Reform Law of 2012 which mandates the increase on retail of cigarettes in the country.

Majority of the respondents with 39 or 65% have no history of alcohol consumption while Positive history of alcohol consumption accounted for 21 or 35%. According to Creswell et al,[9] 2011, the link between alcohol consumption and risk of TB concluded that people who consume, on average, .40 g alcohol a day (heavy drinkers) and/or have an alcohol-use disorder have three times the risk of developing TB, while low-to-medium alcohol consumption does not seem to increase the risk of disease. Alcohol use-related health disorders are associated with several clinical conditions that may impair the immune system. In addition, alcohol has a direct toxic effect on the immune system. Furthermore, heavy alcohol use may be a secondary cause of micro- and macronutrient deficiency, which can also impair immunity. Excessive alcohol use is also associated with poor TB treatment adherence, and a number of studies have found higher relapse rate among heavy drinkers and those with alcohol use-related health disorders. In this study, most of the respondents 57 (95.0%) had no history of drug use while 3 (5%) claimed that they

tried using illicit drugs like methamphetamine for 2 (3.3%) and cocaine 1 (1.7%). According to Buff et al., 2010, substance abuse hinders TB control at every step, from delayed diagnosis to failed treatment of TB disease and LTBI and there are difficulties of treatment adherence and completion in persons with alcohol or drug dependence. Alcohol and drug use are well-documented barriers to TB control. However, majority of the TB relapse patients do not consume alcohol. This may be consistent with the socio-economic status of the respondents. With the increasing price on the commodities needed by family which are satisfied to sustain a living, and also considering the increasing price of alcohol, patients may tend to satisfy first the needs rather than engaging to alcohol and illicit drug use.
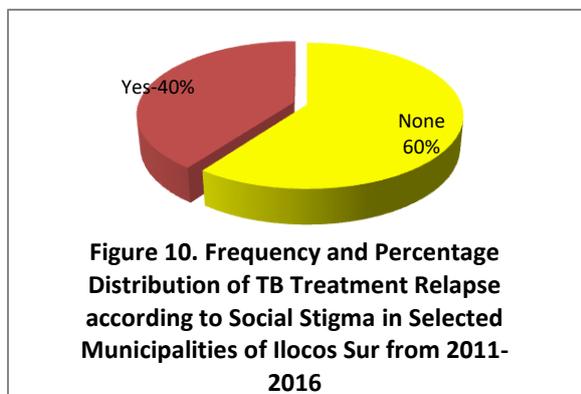
In clinical settings, a heightened awareness of TB symptoms could be employed with active screening for TB symptoms among patients with known or suspected alcohol abuse and/ or smoking. Although smokers as a general population are difficult to reach, they probably seek care more often than non-smokers, and opportunities to engage and screen smokers for TB symptoms should not be missed. A high index of suspicion for TB among patients who smoke and among those who present with other risk factors for TB (contacts, COPD, alcohol use, etc.) can increase case detection.

Forty four (44) out of 60 respondents with a percentage of 73.3 said that none among members of the family have PTB while 16 or 26.7% revealed that there were members of their family have PTB. This is inconsistent with the findings of Ghafoor et al.[9] Out of the 26.7%, the mostly affected member of the family were children with 8.3% followed by grand children with 6.7% which shows that age are prone to acquire TB due to their low capacity to resists infection or have low immune system.
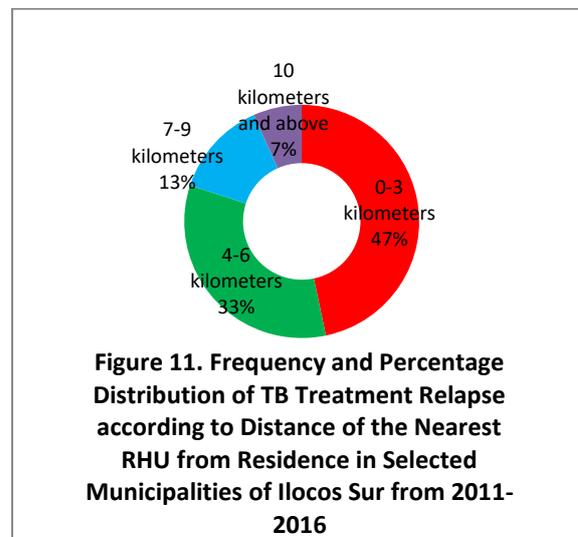
A great percentage of the respondents (60%) claimed that they did not experience social stigma while 40% said they experienced such. The fear of infection and inappropriate health education may be the main causes of tuberculosis stigma. The patients experienced isolation within their family and community, separation, and financial crisis. The stigma attached to tuberculosis may contribute to delayed healthcare seeking, poor treatment adherence, and poor prognosis. Family and community members may avoid contact with patients, with some really presenting an awkward posture alongside the continuing presence of TB patients probably to avoid being infected. The patients may also be expected to employ separate tableware and serving dishes when eating. In most African societies sharing household activities, such as cooking and eating from a common bowl is the norm. The unjustified prohibition of such cultural norms and practices because of the disease can result in further isolation of the patients in society. In the same token, fragmented and poorly designed media messages were indicated as other hurdles leading to fear of the disease in society. This may also add to the stigmatization of TB patients. Proper health education to the public or community awareness should be done to prevent the stigma to the patients brought about by having the disease. Psychological support, problem-solving and emotional skills, preparing culturally sensitive and

scientifically sound media messages, providing financial support for the patients should also be given by health care professionals to the relapse patients to ensure compliance and enhancing the qualities of the healthcare workers, such as empathy, concern, respect for the patient and cultural sensitivity.

Figure 10. Frequency and Percentage Distribution of TB Treatment Relapse according to Social Stigma in Selected Municipalities of Ilocos Sur from 2011-2016

According to the study of Boru et al,[13] inaccessibility of health services, especially for those who came from remote areas, was reported to have profound effects on adherence to TB treatment. This is the most prominent factor in developing countries where there is a limited physical accessibility to such services and poor infrastructure. In contrast to this research study, nearly forty seven per cent (46.7%) of the respondents are residing 0-3 kilometers away from the RHU, 4-6 kilometers with a percentage of 33.3%. 13.3% (8) of the respondents were 7-9 kilometers away from the RHU and 6.7% of them were located more than 10 kilometers. This finding may be due to working hours of the health centers and health posts which may have a contribution for non-adherence, particularly, for those patients who have job since the working hours are similar. Patients are forced to miss either the job or the pills especially during the intensive
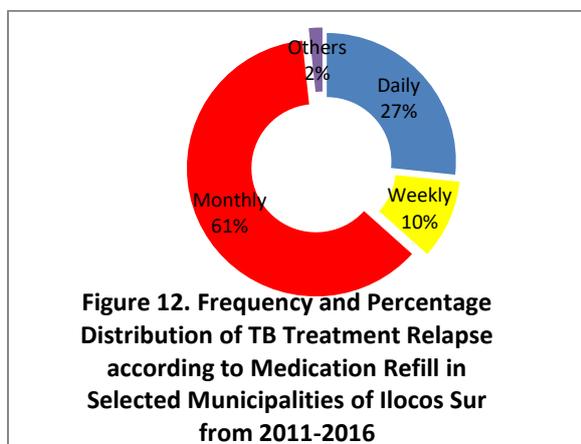
phases. This finding should be properly addressed and also, further studies may be done to investigate as to the reasons why this finding occurred.

Figure 11. Frequency and Percentage Distribution of TB Treatment Relapse according to Distance of the Nearest RHU from Residence in Selected Municipalities of Ilocos Sur from 2011-2016

The majority of patients with 26.7% have their children as treatment partners. This shows that children as treatment partner may have a limited knowledge on the treatment for the patient. Treatment partners play a very important role in the adherence to TB treatment which is crucial to achieving cure while avoiding the emergence of drug resistance. Regular and complete medication intake provides individual TB patients the best chance of cure and also guards the community from the spread of TB. Proper knowledge and instructions should be given to treatment partners.

In terms of treatment refill, majority comprised of 61.7% had their medication refill on a monthly basis, daily with 26.7%, weekly refill with 10%, and others with 1.7%. In this finding, most relapsed patients had self-administered therapy where patients tend to get their medication supply for the whole month. According to the WHO's Guidelines for Tuberculosis

Treatment, 2012, Directly observed treatment (DOT) or watching patients taking their medications is essential at least during the intensive phase of treatment (the first two months) to ensure that the drugs are taken in the right combinations and for the appropriate duration. For TB patients who live close to a health facility, the treatment supporter will be one of the staff in the health facility, and this is the ideal choice if convenient to the patient. For TB patients who live far away from a health facility the treatment observer will be a community health worker or a trained and supervised local community member with suitable training and monitoring. This enters the proper implementation of DOTS in Ilocos Sur to be in question, and how health care professionals adhere to the DOTS program of the Department of Health, however, further studies should be done since monthly refill of TB treatment medications are allowed in the five municipalities under this research study to really address this factor.

Figure 12. Frequency and Percentage Distribution of TB Treatment Relapse according to Medication Refill in Selected Municipalities of Ilocos Sur from 2011-2016
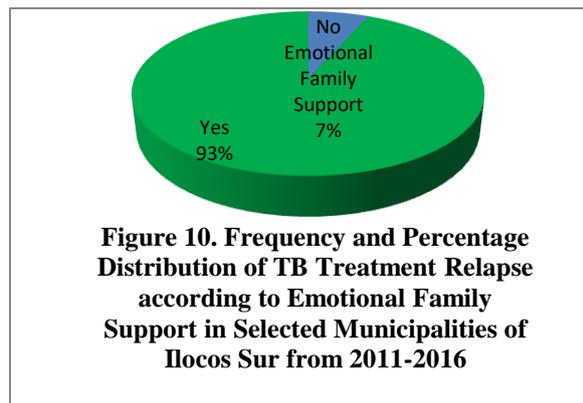
68.3 per cent of the respondents confirmed that they did not miss any medication during the course of their treatment while 31.7% admitted that they missed taking anti-TB medication. In connection to the majority of the patients having monthly refill of medications, patients self-administer treatment often take drugs irregularly, tracing is difficult and often unproductive and there is also a much longer delay between interruption of treatment and action by the health system. Among these 31.7% who missed their medications, majority of them (15%) admitted that they missed once, twice (6.7%), 5% missed five times, 3.3% thrice and (1.7%) acknowledged missing it four times. Of the 31.7% who missed their medications, the major reason for missed medications (13.3%) were due to forgetfulness followed by presence of side effects (8.3%) while taking TB regimen then 6.7% of them claimed that they felt good and symptoms were gone. The minor reason (3.3%) of missed medication was due to inability to get their medications. This was also observed by others.[14-18]

A great majority (93.3%) of the respondents revealed that they were emotionally supported by their families during the course of the disease while 6.7% affirmed that they did not receive any and this emotional support should be addressed by health care professionals since in the attainment of health of every patient, addressing the whole aspects of health is needed not just physical but also emotional, mental and social health. Although the presence of emotional support from families is strikingly high, proper education and knowledge on treatment partners should be instilled to help ensure treatment success. This supports the WHO's Guidelines for treatment of tuberculosis where treatment supporters should be instructed on the course of treatment of the patients and also to report the persistence or reappearance of

symptoms of TB, symptoms of adverse drug reactions, or treatment interruptions.

Figure 10. Frequency and Percentage Distribution of TB Treatment Relapse according to Emotional Family Support in Selected Municipalities of Ilocos Sur from 2011-2016

CONCLUSION:

Majority of the respondents comprised of 98.3% were treated by physicians where 90% were under the care of General practitioners, 5% for internists and 3.3% for pulmonologists. In this finding, factor to TB treatment relapse may be due to non-compliance of the General Practitioners in the guidelines in treating TB cases. All patients receiving treatment should be monitored during the course of treatment to assess patients' response to the drug. Regular monitoring also helps to ensure that patients complete their treatment. It can also help to identify and manage adverse drug reactions. Further studies should also be made considering the attitude and appropriate training of the General Practitioners and other health care professionals in the Rural Health Units which this may greatly affect the compliance of the patients.

CONFLICT OF INTEREST. The authors have no conflict of interests to declare.
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