

**THE ASSOCIATION BETWEEN DEPRESSION AND
QUALITY OF LIFE AMONG ADULTS WITH
PULMONARY TUBERCULOSIS**



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THE ASSOCIATION BETWEEN DEPRESSION AND QUALITY OF LIFE AMONG ADULTS
WITH PULMONARY TUBERCULOSIS

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ABSTRACT

This cross – sectional study aimed to study the association between the depression and the quality of life among patients with pulmonary tuberculosis. The study sample was 113 patients who were registered and treated in the tuberculosis clinic of the government hospital in Khon Kaen Province during November 2011 to January 2012. Tuberculosis characteristics derived from case record forms, depression and quality of life were determined by PHQ-9 and WHOQOL–BREF respectively. Descriptive statistics, Spearman rank correlation (r_s), 2 sample t-test, 1 – way ANOVA and multiple linear regression with p – value < 0.05 were analyzed by SPSS for Windows version 19.

The result showed that 20.4% of patients had depression. Patients in the intensive phase of tuberculosis treatment had poorer psychological health than patients in the continuation phase of tuberculosis treatment ($p = 0.041$). Patients with depression had much poorer physical and psychological health than those without depression ($p < 0.001$). Depression is a rather poor negative correlation with quality of life by r_s and varied from -0.15 (social relationship) to -0.54 (physical health). The interaction of the phase of the treatment and depression were associated with both physical and psychological health ($p < 0.001$). The results after controlling other confounders by multiple linear regression analysis, were the effect of depression on quality of life of pulmonary tuberculosis, was poor physical health and psychological health in the either the intensive or the continuation of treatment phase ($p < 0.001$).

Depression is a commonly mentioned consequence of TB. The effect of depression on the quality of life of pulmonary tuberculosis was worse than for those without depression in all phases of their treatment. Planning and developing an appropriate public health system should be done to increase the quality of life of the patients, it would be reasonable to assess the psychiatric status with particular reference to depression at an early stage and during the phases of treatment to go together with the treatment of tuberculosis.

KEY WORDS: DEPRESSION / QUALITY OF LIFE / PULMONARY TUBERCULOSIS

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ความสัมพันธ์ระหว่างภาวะซึมเศร้ากับคุณภาพชีวิตของผู้ป่วยวัณโรคปอด

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บทคัดย่อ

การศึกษานี้เป็นการศึกษาแบบภาคตัดขวาง (cross – sectional) มีวัตถุประสงค์เพื่อศึกษาความสัมพันธ์ระหว่างภาวะซึมเศร้ากับคุณภาพชีวิตของผู้ป่วยวัณโรคปอด โดยทำการศึกษาในกลุ่มผู้ป่วย 113 คน ที่ขึ้นทะเบียนและมารับรักษาในคลินิกวัณโรค ของโรงพยาบาลรัฐบาลในจังหวัดขอนแก่น ระหว่างเดือนพฤศจิกายน 2554 – มกราคม 2555 ข้อมูลเกี่ยวกับวัณโรคของผู้ป่วยได้จากแบบบันทึกการรักษา ข้อมูลภาวะซึมเศร้าและคุณภาพชีวิตได้จากแบบสอบถาม PHQ-9 และ WHOQOL-BREF วิเคราะห์ข้อมูลโดยใช้สถิติเชิงพรรณนา, Spearman rank correlation (r_s), 2 sample t-test, 1 – way ANOVA และ multiple linear regression โดยโปรแกรม SPSS for Windows version 19 กำหนดระดับนัยสำคัญทางสถิติ 0.05

ผลการศึกษาพบว่า ผู้ป่วยวัณโรคปอดมีภาวะซึมเศร้าร้อยละ 20.4 ผู้ป่วยที่รักษาวัณโรคในระยะเข้มข้นมีคุณภาพชีวิตด้านจิตใจต่ำกว่าผู้ป่วยที่รักษาในระยะต่อเนื่อง ($p=0.041$) ผู้ป่วยที่มีภาวะซึมเศร้ามีคุณภาพชีวิตด้านร่างกายและจิตใจต่ำกว่าผู้ป่วยที่ไม่มีภาวะซึมเศร้า ($p<0.001$) ภาวะซึมเศร้ามีความสัมพันธ์เชิงลบกับคุณภาพชีวิตมีด้วยค่า r_s อยู่ระหว่าง -0.15 (ด้านความสัมพันธ์ทางสังคม) ถึง -0.54 (ด้านร่างกาย) ปฏิกริยาร่วม (Interaction) ระหว่างภาวะซึมเศร้ากับช่วงเวลาในการรักษาวัณโรคส่งผลกระทบต่อสุขภาพด้านร่างกายและจิตใจของผู้ป่วย ($p<0.001$) ผลการวิเคราะห์ multiple linear regression หลังการควบคุมผลกระทบจากปัจจัยอื่นๆแล้ว พบว่า ภาวะซึมเศร้าส่งผลให้คุณภาพชีวิตด้านร่างกายและด้านจิตใจของผู้ป่วยวัณโรคปอดแย่ลง ทั้งในการรักษาระยะเข้มข้นและระยะต่อเนื่อง ($p<0.001$)

ภาวะซึมเศร้าเป็นโรคร่วมที่พบได้บ่อยมากในผู้ป่วยวัณโรคปอด และยังส่งผลทำให้ผู้ป่วยมีคุณภาพชีวิตที่แย่ลงในทุกช่วงของการรักษา การวางแผนพัฒนาระบบบริการสาธารณสุขที่เหมาะสมเพื่อพัฒนาคุณภาพชีวิตของผู้ป่วยวัณโรคให้ดีขึ้น จำเป็นต้องมีการประเมินภาวะสุขภาพจิตโดยเฉพาะภาวะซึมเศร้าควบคู่กับการรักษาวัณโรคตั้งแต่เริ่มรักษาและในระหว่างการรักษา

CONTENTS

	Page
ACKNOWLEDGMENTS	iii
ABSTRACT (ENGLISH)	iv
ABSTRACT (THAI)	v
LIST OF TABLES	viii
LIST OF FIGURES	ix
CHAPTER I INTRODUCTION	1
1.1 Rationale and background	1
1.2 Objective	3
1.3 Research hypothesis	3
1.4 Variable of research	3
1.5 Scope of the study	4
1.6 Expected outcome and benefits	4
1.7 Operational definition	4
1.8 Conceptual framework	6
CHAPTER II LITERATURE REVIEW	7
2.1 Tuberculosis	8
2.2 Depression and tuberculosis	15
2.3 Quality of life and assessment	17
2.4 The relevant researches	20
CHAPTER III MATERIAL AND METHODS	25
3.1 Research design	25
3.2 Study population	25
3.3 Inclusion criteria for patients	25
3.4 Exclusion criteria for patients	26
3.5 Data collection period	26
3.6 Sample size	27
3.7 Sampling	29

CONTENTS (cont.)

	Page
3.8 Research instrument	30
3.9 Data collection	35
3.10 Data analysis	36
CHAPTER IV RESULTS	37
4.1 Demographic and clinical characteristics	38
4.2 The correlation between the depression score and quality of life	44
4.3 Factors associated with quality of life by univariate analysis	45
4.3 Association between depression and quality of life after controlling other confounders	58
CHAPTER V DISCUSSION	63
5.1 Summary	63
5.2 Discussion	64
5.3 Limitation	67
CHAPTER VI CONCLUSION AND RECOMMENDATIONS	68
6.1 Conclusion	68
6.2 Recommendation	68
REFERENCES	70
APPENDIX	76
BIOGRAPHY	86

LIST OF TABLES

Table	Page
2.1 The anti-tuberculosis treatment regimens based on the categories of patients	13
2.2 Domains and facets of WHOQOL-BREF	19
3.1 The interpretation of scores obtained from PHQ-9	31
3.2 Rating criteria used for the assessment of the quality of life	32
3.3 Method for converting raw scores to transformed scores	34
4.1 Distribution of 113 pulmonary tuberculosis patients in 4 hospitals	37
4.2 Demographic characteristics of 113 pulmonary tuberculosis patients	39
4.3 Clinical characteristics of 113 pulmonary tuberculosis patients	40
4.4 Interpretation of PHQ-9 scores obtained from 113 pulmonary tuberculosis patients	41
4.5 Quality of life of 113 pulmonary tuberculosis patients	42
4.6 Spearman rank correlation (r_s) between depression and quality of life	45
4.7 Factors associated with physical health: univariate analysis	47
4.8 Effect of phase of treatment and depression on physical health	48
4.9 Factors associated with psychological health: univariate analysis	50
4.10 Effect of phase of treatment and depression on psychological health	51
4.11 Factors associated with social relationship: univariate analysis	53
4.12 Effect of phase of treatment and depression on social relationship	54
4.13 Factors associated with environment: univariate analysis	56
4.14 Effect of phase of treatment and depression on environment	57
4.15 Summary of univariate analysis of each domain of quality of life	58
4.16 Results of multiple linear regression analysis of each domain of quality of life	61

LIST OF FIGURES

Figures		Page
1.1	The conceptual framework	6
4.1	Distribution of depression score in 113 pulmonary tuberculosis patients	41
4.2	Distribution of each domain of quality of life	43
4.3	Scatter plot of depression score and quality of life score	44
4.4	Examining interaction between depression and treatment phase on physical health	48
4.5	Examining interaction between depression and treatment phase on psychological health	51
4.6	Examining interaction between depression and treatment phase on social relationship	54
4.7	Examining interaction between depression and treatment phase on environment	57
4.8	The interaction between depression and phase of treatment on quality of life	59
4.9	Regression coefficients for a variable comprising depression and phase of treatment	62

CHAPTER I

INTRODUCTION

1.1 Rationale and background

Tuberculosis, before 1944, was the primary killer of worldwide human beings. However, its severity was gradually decreased due to the discovery of antibiotics and BCG (1). Unfortunately, tuberculosis, at present, has turned to be one of the worldwide major health problems resulted from the pandemic of HIV and AIDS, increasing poverty and immigrating labors. The World Health Organization (WHO) has assessed the status of the tuberculosis epidemic and estimated that at least one-third of the world population is infected with tuberculosis while about 9.2 million new tuberculosis patients are reported each year. It could be noted that 95% of all case and 98% of all deaths, were tuberculosis patients lived in developing countries (2-4) ; 75% of tuberculosis patients in developed countries are in the economically productive age group (15-54 years) (2, 5-7). Tuberculosis kills more than 2 million people each year (8). The WHO thus recommended DOTS (directly observed treatment, short – course) strategy to be used to control and reduce the incidence rate of tuberculosis. Currently, more than 150 countries have used DOTS program resulting in the decline the rates of incidence, prevalence and mortality caused by tuberculosis since 2004 (3, 4). In 2008, Thailand was suffered from tuberculosis in the 18th place from 22 countries with high burden of tuberculosis (4, 7, 9, 10). In patients with pulmonary tuberculosis was found to be most (76.05%), (11). whereas Khon Kaen Province has the highest morbidity rate of tuberculosis in the 3rd rank of Thailand, with the rate of 94.56 per 100 000 population (12).

The main target of global tuberculosis control emphasizes only on treatment success rate. In fact, tuberculosis effects not only to physical health but also mental health, economy, and social status of the patients (13). The serious interest is then paid to assess the health-related quality of life (HRQL) of tuberculosis patients

(14-29). Since the health-related quality of life (HRQL) is the health assessment based on the patient report outcomes (PROs) for all domains, the daily personal performance, perception of physical health, mental health and social aspects can be inclusively described. The understanding about the effect of tuberculosis and treatment based on the patient perspective is very important for the health management systems (30, 31). The global studies reported that tuberculosis significantly affected the quality of life of the patients (14-18, 21, 23, 24, 26, 28, 29). Most of the previous studies, however, paid the interest on the dimensions of tuberculosis and its treatment such as to the categories of tuberculosis patients, site of tuberculosis, sputum smear results, number of symptoms, treatment duration, results of sputum conversion, and treatment outcome (15, 16, 18, 21-24). Unfortunately, other factors, for example, the depression may be important. A study showed that the depression significantly affected and worsened the quality of life among patients with tuberculosis but it did not indicate the strength of association (21). A study on the positive-HIV patients with tuberculosis and depression revealed that such patients were 8.8 times risky to have a lower quality of life when compared with the ones without depression (OR = 8.8, 95% CI : 3.2 – 23) (32). The studies on the quality of life of the patients with other chronic diseases like asthma, cystic fibrosis, chronic obstructive pulmonary disease (COPD), and heart failure, showed that the depression was one of factors associated with lower quality of life (33-37). More important, tuberculosis is one of chronic diseases that tends to result in higher prevalence of depression (13, 38-41). The studies in Thailand indicated that 33% of the patients with pulmonary tuberculosis were suffered from the depression (42). Hence, this research aimed to study the association between the depression and the quality of life among the patients with pulmonary tuberculosis.

Question Research : Is there association between the depression and the quality of life among the patients with pulmonary tuberculosis?

1.2 Objective

To determine the association between the depression and the quality of life among the patients with pulmonary tuberculosis

1.3 Research hypothesis

The depression is association with the quality of life of the patients with pulmonary tuberculosis.

1.4 Variables of the research

Independent variables

- I. Demographic characteristics
 - Age
 - Gender
 - Marital status
 - Educational level
 - Occupation
 - Family income
- II. Characteristic of tuberculosis in patients
 - Severity of tuberculosis
 - Category of tuberculosis patients
 - Duration of treatment
- III. Depression

Dependent variable

- I. Quality of life

1.5 Scope of study

This study was conducted among the outpatients registered and treated in the tuberculosis clinic of the government hospital in Khon Kaen Province during November 2011 to January 2012.

1.6 Expected outcome and benefits

1.6.1 To use the information obtained from this research in planning and developing the public health system and also in improving the quality of life of the patients; and

1.6.2 To gain the information that is useful for further studies.

1.7 Operational definition

Patients with pulmonary tuberculosis mean the patients having pathology in pulmonary and sputum smear positive for AFB or sputum smear negative for AFB and chest x-ray abnormalities consistent with active pulmonary tuberculosis or culture positive for *Mycobacterium tuberculosis* with a decision by a clinician to treat with a full course of anti- tuberculosis treatment (2, 4).

Severity of tuberculosis means the spread of pulmonary tuberculosis pathology that can be dangerous and may transfer to other people. By this study, the latest results of sputum smear for AFBs (before treatment) were used in describing the two levels of tuberculosis severity:

- 1) Less severe means the patients with non-cavitary, sputum smear negative for AFB who are known to be HIV-negative.
- 2) Severe means the patients with cavitary or smear- positive pulmonary tuberculosis or who are HIV- positive (2, 4).

Categories of patients mean the categorization of patients based on the diagnostic category and effective treatment regimen. This study categorized the patients into 2 categories as follows:

1) Category I means the patients with pulmonary tuberculosis who were treated for the first time, namely, the new sputum smear positive cases, and the new sputum smear negative cases.

2) Category II means the previous cases or retreatment cases as, namely, the relapse, the treatment after failure, the treatment after default (4, 43).

Phase of treatment means the period of time from the day the patients received the tuberculosis treatment. It can be divided into two phases as follows:

1) Intensive phase or Initial phase: Since the drugs used in this phase can rapidly and almost totally kill the tubercle bacilli, the patients can go beyond the acute phase based on the different period as below:

- CAT I, III: The intensive phase lasts about two months or maybe three months in case that the patient's sputum is still positive.

- CAT II: The intensive phase takes approximately three months or can be extended to four months if the patient's sputum is still positive.

2) Continuation phase: This phase is the treatment following the intensive phase. In this phase, the antibiotics are given to the patients for the prevention of tuberculosis re-occurrence. The continuation period is different as below:

- CAT I, III: The continuation phase is about four months.

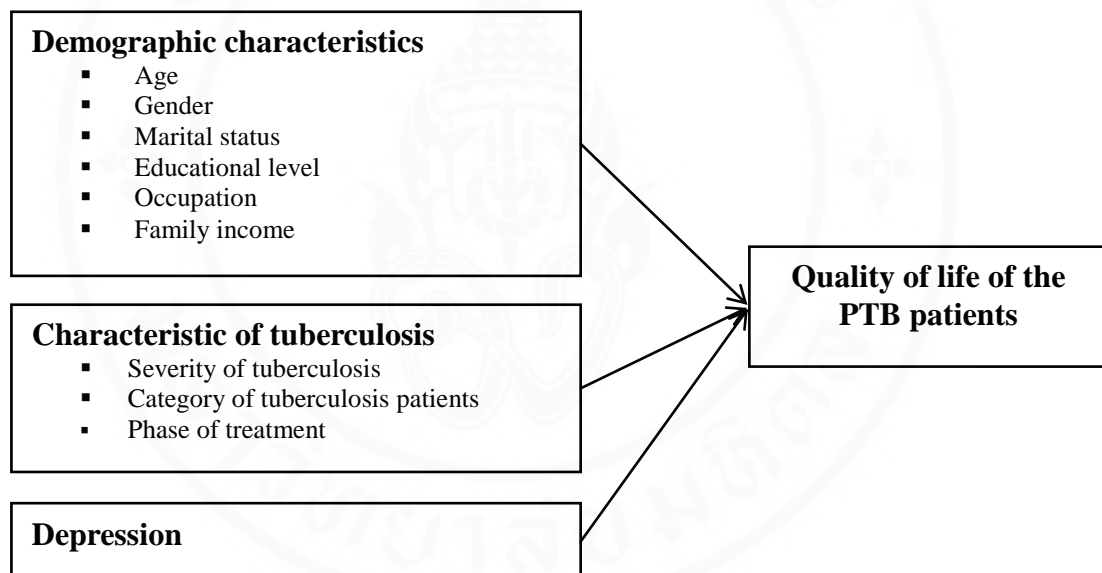
- CAT II: The continuation phase takes approximately five months (4).

Depression means or the state of depression found among the tuberculosis patients; it was determined by the Patients Health Questionnaire - 9 (PHQ-9), translated and verified the reliability and validity by Manote Lortrakul et al, cut-off point at least 9 scores were depression (44).

Quality of Life means a level of the quality of life of the patients with tuberculosis assessed by the tool kit developed by WHO (WHOQOL – BREF – Thai) (45).

1.8 Conceptual framework

Figure 1.1 The conceptual framework



CHAPTER II

LITERATURE REVIEW

Reviewing of the literature included:

- 2.1 Tuberculosis
- 2.2 Depression and tuberculosis
- 2.3 Quality of life and assessment
- 2.4 The relevant researches:
 - 2.4.1 Demographic characteristics and quality of life
 - 2.4.2 Severity of tuberculosis patients and quality of life
 - 2.4.3 Categories of patients and quality of life
 - 2.4.4 Phase of treatment and quality of life
 - 2.4.5 Depression and quality of life

2.1 Tuberculosis

Tuberculosis is a bacterial disease that can be found in various organs especially in the lung, which is known as the pulmonary tuberculosis. Over 99% of the tuberculosis is caused by the *Mycobacterium tuberculosis* while the other less than 1% is caused by the different strains like *Mycobacterium bovis* and *Mycobacterium africanum*. Tuberculosis can be spread via coughing, sneezing, and spitting of sputum. The droplet nuclei are very tiny (usually less than 5 μm in diameter). As such, the droplet nuclei can be in the air and respiration systems, and can easily penetrate into the terminal alveoli of the lungs, where multiplication and infection begin (2, 46). A single coughing can produce 3,000 droplet nuclei. The direct sunlight can kill the tubercle bacilli in 5 minutes but the tubercle bacilli can still survive in the dark for the longer period. An individual's risk of exposure to the tubercle bacilli depends on the concentration of the contaminated droplet nuclei and the length of time such individual breathes the tubercle-contaminated air. On the other hand, a risk of infection depends on the sensitivity and susceptibility of infection. The risk of infection will be lower in case of the patients with negative sputum smear and lowest in case of the ones with extra-pulmonary tuberculosis (2). The risk of the contact to the patients with positive smear tuberculosis is ten times than the exposure to the ones with negative sputum smear (47). However, only 10 % of the infected patients will be suffered from tuberculosis. The tuberculosis may be occurred after the infection in a few weeks or even 20 - 30 years (4). Without proper treatment, one fourth of the patients will be dead in the next two years; 50 % in the next five years; 25% may be self-cured by a strong immune defense; and 25% may be suffered from the chronic tuberculosis and spreads the tuberculosis to others (2, 47). The most important symptoms of pulmonary tuberculosis include the coughing lasting more than 2 or 3 weeks, sputum production, and weight loss; other symptoms are the loss of appetite, tiredness, fever, night sweats, haemoptysis, chest pain, and breathlessness (2, 4, 48). The diagnosis of pulmonary tuberculosis can be diagnosed by various methods as follows: 1) The direct smear results in lower sensitivity but higher specificity. Thus, this method is mainly used by the Tuberculosis Control Office of Thailand. If the AFB (Acid Fast Bacilli) is found, the tuberculosis can be almost defined with immediate treatment without any culture or microscopy; 2) The tuberculosis culture is high in specificity. So, it is the gold

standard of the diagnosis. If two positive sputum test results are shown, there is no need for the culture; 3) The sensitivity of the chest x-ray is high but its specificity is quite low. Although many studies conclude that the chest x-ray results may not indicate the exact tuberculosis but such chest x-ray is still to be used to support the diagnosis because the cavity found in the chest increases the possibility of tuberculosis; and 4) Since the BCG vaccination in Thailand is quite high, it is very hard to differentiate the tuberculin reaction when the tuberculin skin test is used. Nevertheless, this method is still useful for the tuberculosis diagnosis when the diameter of the detected induration is larger than 10 mm (4, 48).

2.1.1 Type of tuberculosis patients

The tuberculosis patients can be mainly divided into two types based on the infected organs as below:

2.1.1.1 Extra-pulmonary Tuberculosis means the tuberculosis occurred in other organs excluding the lung e.g. pleura, lymph nodes, abdomen, genitourinary tract, skin, joints, bones, and meninges. The diagnosis is based on the culture. If the culture once indicates as *M. tuberculosis*, or the patients have histological results and/or show the strong clinical evidence consistent with active extra-pulmonary tuberculosis, the clinician may decide to treat such patients with a full course of anti-TB treatment. A patient diagnosed with both pulmonary and extra-pulmonary tuberculosis should be classified as a case of pulmonary tuberculosis (2, 4, 48)

2.1.1.2 Pulmonary Tuberculosis means the tuberculosis and pathology in the lesions caused in the lung by *M. tuberculosis*. The laboratory test and chest x-ray is required for the diagnosis (4). The patients with pulmonary tuberculosis are divided into two groups based on the sputum smear results as follows:

2.1.1.2.1 Sputum smear positive pulmonary tuberculosis when:

- Two or more initial sputum smear examinations are positive for AFB;
- One sputum smear positive for AFB, and CXR abnormalities consistent with the active pulmonary tuberculosis as determined by a clinician;
- One sputum smear positive for AFB, which is also culture positive for *M. tuberculosis* (2, 4, 48)

2.1.1.2.2 Sputum smear negative pulmonary tuberculosis when:

- Three or more initial sputum smear examinations are negative for AFB; if the chest x-ray indicates the pathological wound in the lesions, the clinician may define this as the active tuberculosis with the treatment of tuberculosis medication;
- Three or more sputum smear negative results plus the detection of *M. tuberculosis* (4, 48)

Since most of the tuberculosis patients are the pulmonary ones, they can mainly spread the tubercle bacilli to other people. Thus, in this research, the pulmonary tuberculosis patients were focused. The division of patients based on the tuberculosis organs and the sputum smear tests could properly indicate the severity of tuberculosis in accord with the definition of the WHO.

2.1.2 Severity of Tuberculosis

The severity of tuberculosis, according to the definition of the WHO, can be divided into two levels as below:

2.1.2.1 Less severe means the condition of a patient, during the intensive treatment, shows a non-cavitary, sputum smear negative pulmonary tuberculosis, non-HIV while the less severe level of extrapulmonary tuberculosis is found in the lymph node, pleural effusion (unilateral), bone (excluding spine), peripheral joint, and adrenal gland.

2.1.2.2 Severe means the condition of a patient, during the intensive treatment shows a cavitary, and/or the sputum smear positive pulmonary tuberculosis while the severe extrapulmonary tuberculosis is found in the meningitis, miliary, pericarditis, peritonitis, bilateral or extensive pleural effusion, spinal, intestinal, and genitourinary. (2, 4)

2.1.3 Registration of tuberculosis patients

To facilitate the planning of treatment, assessment of drug resistance, and achievement of treatment, the patients should be registered for one of the following types:

2.1.3.1 New case means:

- A patient who has definitely never taken anti-tuberculosis drugs;
- A patient who has taken anti-tuberculosis drugs for less than one month (2, 4, 48).

2.1.3.2 Relapse means a tuberculosis patient who previously received treatment and was declared as recovered or completely treated. However, the tuberculosis re-occurred to such patient with the indication of sputum smear positive or culture positive (2, 4, 48).

2.1.3.3 Treatment after failure means a condition when a patient receives the treatment again after the failure on the previously-treated drugs in the following cases:

- A patient with sputum smear positive tuberculosis has been treated as Category I (see a description in section 2.1.4). However, the sputum smear results of the fifth month or later remained positive or became positive.

- A patient with sputum smear negative tuberculosis or extra-tuberculosis has been treated but the sputum smear results at the end of the second month was positive (4, 48).

2.1.3.4 Treatment after default means a condition when a patient receives a treatment again after the discontinuation of consecutive two months.

2.1.3.5 Transfer in means a patient who is transferred from other hospital with proper registration and treatment for a while.

2.1.3.6 Other means a patient who cannot be categorized in the groups mentioned earlier, such as:

- Bacteriologically negative relapse;
- A tuberculosis patient who has been treated by a clinic or private health institute for over a month but such patient is still not been registered in the National Tuberculosis Plan before; and
- Chronic case, namely, a patient with complete course of re-treatment but his/her sputum is still positive (4).

The registration of tuberculosis patients depends on the categories of patients based on the tuberculosis organs, severity of tuberculosis, sputum smear results, and history of treatment. Thus, the patients are divided into four categories to be in compliance with the drugs used for the tuberculosis treatment.

2.1.4 Categories of patients and treatment

To treat the tuberculosis, the patients must be categorized into the four categories based on the tuberculosis organs to be in compliance with the drugs used for the tuberculosis treatment. The tuberculosis treatment needs a systematical regimen system because various drugs with proper dose and type must be given to the patients continually for a proper duration, especially in the new tuberculosis cases who have definitely never been treated. In such new cases, the sputum can be 85% to 100% free from the tubercle bacilli whereas the recurrence of tuberculosis is only 2% to 3% (4, 43). Currently, there are four standard anti-tuberculosis drug regimens, based on the categories of patients, used in the treatment as shown in Table 2.1

Table 2.1 The anti-tuberculosis treatment regimens based on the categories of patients (2, 4)

Tuberculosis diagnostic category	Tuberculosis patients	Tuberculosis treatment regimens	
		Intensive phase	Continuation phase
CAT I	New sputum smear positive Severe sputum smear negative Severe extra-pulmonary Tuberculosis with HIV/AIDS	2HRZE(S)	4HR
CAT II	Previous case or Retreatment case and sputum smear positive Relapse treatment after failure treatment after default	2SHRZE / 1HRZE	5HRE
CAT III	New sputum smear negative extra-pulmonary	2HRZ	4HR
CAT IV	Chronic case MDR-TB	Second line drug	

* **Note:** Isoniazid (H), Rifampicin (R), Pyrazinamide (Z), Streptomycin (S), Ethambutol (E); the number before the regimen represents the months the patients take the drugs.

It can be noted that the categories of tuberculosis patients are in accord with the registration of the tuberculosis patients, treatment regimens, and duration of treatment. At present, most of the patients in Category III are treated with the regimen similar to the ones in Category I. As such, in this research, the categories of patients were organized in compliance with the actual treatment performed by the tuberculosis clinics and registration of tuberculosis patients as follows:

I. Category I means a tuberculosis patient who is treated for the first time. Such patients include the new positive sputum smear cases, and the new negative sputum smear cases.

II. Category II means a tuberculosis patient who has been treated (previous case or retreatment case) including the cases of relapse, treatment after failure, treatment after default.

2.1.5 Phase of treatment

The duration of treatment usually depends on the categories of patients. Normally, the duration of treatment can be divided into two phases as follows:

2.1.5.1 Intensive phase or Initial phase: Since the drugs used in this phase can rapidly and almost totally kill the tubercle bacilli, the patients can go beyond the acute phase based on the different period as below:

- CAT I, III: The intensive phase lasts about two months or maybe three months in case that the patient's sputum is still positive.
- CAT II: The intensive phase takes approximately three months or can be extended to four months if the patient's sputum is still positive (4).

2.1.5.2 Continuation phase: This phase is the treatment following the intensive phase. In this phase, the antibiotics are given to the patients for the prevention of tuberculosis re-occurrence. The continuation period is different as below:

- CAT I, III: The continuation phase is about four months.
- CAT II: The continuation phase takes approximately five months (4).

With the high efficiency of treatment regimens, the tuberculosis patients can be almost 100% cured if the patients continually take the full course of given drugs (4). However, the increase of treatment failure and the rise in the prevalence of tuberculosis are caused due to the lack of treatment adherence and the poor treatment adherence (49). Depression is one of the factors resulting in a non-adherence, and a refusal to change the deficit lifestyle of the tuberculosis patients leading finally to the severer and chronic tuberculosis (50).

2.2 Depression and Tuberculosis

Tuberculosis is a chronic disease that needs a long duration of treatment. Generally, the patients are suffered from tuberculosis, pathological conditions, continual medication and treatment. Some patients may lose their income and feel that they are disgusted and ostracized by their family and the society due to the possible tuberculosis infection. As a result, the tuberculosis patients tend to be social stigma; some are worried and anxious with the diagnosis of tuberculosis. All of these circumstances enormously affect the living, mental health, and emotional conditions of the patients (10, 51). Besides, the chronic tuberculosis also results in the depression among the patients (52). In fact, depression can be recognized as the psychiatric complication found most among the patients with chronic disease (13, 50). According to the research report of G.D. Natani et al., the depression is directly related with the duration and severity of tuberculosis including the response to the chemotherapy. The depression can be found among the freshly diagnosed cases (48%), among the patients with a good response to treatment (38%), and among the patients with failures of

treatment or among the patients with persistently-positive sputum (68 %) (41). The research report of Shahina Qayyum et al. indicates that the tuberculosis patients are 5.3 times more risky to the depression when compared with their normal family members, 13.8 % vs. 45.5 % (OR = 5.3 95% CI = 11.3 - 2.4; $p > 0.001$), (38). Several reports reveal that the prevalence of depression among the tuberculosis patients is very frequent, range from 21.6 % to 68 % (13, 38-42). Furthermore, 52.2% of the tuberculosis patients with multi-drugs resistance (MDR-TB) have encountered the depression during their treatment (40).

Depression can reinforce the severity and chronic condition of the tuberculosis because most of the tuberculosis patients are inactive and do not pay any attention to anything. Added to this, the tuberculosis patients refuse to change their Lifestyle defects or provide any adherence leading to the poor treatment adherence (50). From the studies in UK, most of the tuberculosis patients do not give any adherence and exhibit the negative health behaviors resulting in the higher depression rate (53). Similar to the study results in UK, the study on the association between the depression and the treatment adherence among the tuberculosis patients in Thailand indicates that the tuberculosis patients with depressed had 1.83 times risk to poorer treatment adherence than the tuberculosis patients without depression (OR = 1.83 95% CI = 1.10 - 3.07) (42). The poor treatment adherence is hence regarded as the major treatment failure and also the rise in the prevalence of tuberculosis (43, 49, 54).

2.3 Quality of life and assessment

2.3.1 Quality of life

Quality of life, according to the definition of the WHO, is the individuals' perception of their position in life within the context of the culture and value systems in which they live, and in relation to their goals, expectations, standards, and concerns. This definition reflects the quality of life of an individual that is firmly assessed from the cultural, social, and environmental contexts (45). The health-related quality of life (HRQL) is the significant outcome apart from the life expectancy and the survival. Although such outcome cannot be seen from the clinical or laboratory examination, the assessment of the quality of life leads to the understanding how the disease and also the treatment affect the quality of life based on the patient perspective (31, 45). Besides, the assessment outcome can inclusively explain about the personal potential for the daily living, perception of physical, mental, and social health (30). The assessment is thus very useful for the health service planning, population health monitoring), health or treatment outcomes measurement, and surveillance on clinical patients (31).

2.3.2 Assessment

The health-related quality of life can be assessed by several measurement tools depending on the population and specificity of disease or health conditions. The measurement tools include WHOQOL-100, SF-36, EuroQOL, and EQ-5D (27). In this research, WHOQOL-BREF was used as the measurement tool due to its international standard development that can be used in all culture, health condition, and other domains in particular the legal domain. More important, WHOQOL-BREF has translated this tool into 19 languages including Thai language (45, 56). By these reasons, WHOQOL-BREF has been widely used as it can compare the scores in terms of the epidemiology or multi-data collection from several sources. The data obtained are reliable and can be used in the clinical trials and the determination of baseline scores to gain the changes of the quality of life at the end of the treatment or completion of any measure. Besides, WHOQOL-BREF is expected to be useful in the observation of the disease and in facilitating the decision-making of the clinicians on

the possibility in terms of the treatment advantages and expenses. Using WHOQOL-BREF, the changes of the quality of life resulted from the treatment can be evaluated as well. From the above reasons, the Department of Mental Health, Ministry of Public Health, Thailand, has used WHOQOL-BREF as the standard measurement tool to assess the quality of life of Thai people (45, 55, 56). WHOQOL-BREF is developed from WHOQOL-100, this tool was modified for convenience and operational appropriateness. One question is selected from the 24 sections of WHOQOL-100 whereas the two questions are from the sections of the quality of life and general health; totally, there are 26 questions that are divided into four domains as described in Table 2.2

Table 2.2 Domains and facets of WHOQOL-BREF (45, 56)

Domain	Facets incorporated within domains
1. Physical health	Activities of daily living Dependence on medicinal substances and medical aids Energy and fatigue Mobility Pain and discomfort Sleep and rest Work Capacity
2. Psychological	Bodily image and appearance Negative feelings Positive feelings Self-esteem Spirituality / Religion / Personal beliefs Thinking, learning, memory and concentration
3. Social relationships	Personal relationships Social support Sexual activity
4. Environment	Financial resources Freedom, physical safety and security Health and social care: accessibility and quality Home environment Opportunities for acquiring new information and skills Participation in and opportunities for recreation / leisure activities Physical environment (pollution / noise / traffic / climate) Transport

The scores obtained from each domain of WHOQOL-BREF are similar to the ones measured by WHOQOL-100. The correlation coefficient of these two tools is quite high, from 0.89 (for social relationship domain) to 0.95 (for physical health domain). The study on the validity of WHOQOL-BREF among the population with different characteristics such as the measurement on the quality of life between the patients and the healthy ones, indicates that the scores of the quality of life obtained by the WHOQOL-100 and WHOQOL-BREF are similar whereas the difference of all domains can be also exhibited with statistical significance. Thus, it can be mentioned that WHOQOL-BREF can be properly used instead of WHOQOL-100 in assessing the quality of life when the time is limited (56).

2.4 The relevant researches

2.4.1. Impact of tuberculosis on the quality of life

The previous studies on the quality of life of the tuberculosis patients indicate that tuberculosis affects and declines the patients' quality of life (17, 22). When compared with the normal or healthy people, the mean scores of the tuberculosis patients' quality of life are overall lower than the ones of the normal/healthy people in all domains (16, 18, 21, 26, 28). The studies matching with age, gender, and socio-economic status also provide similar results, that is, the difference of the mean scores of the quality of life between the tuberculosis patients and the normal/healthy people is very high with statistical significance in all domains. It can be explained therefore that the tuberculosis patients' quality of life is overall lower than the one of the general population in all domains due to the affection of tuberculosis (14, 15). The tuberculosis treatment provides positive effect to the patients' quality of life as the physical domain of the patients tends to be more improved when compared with the psychological domain. However, despite the completion of the tuberculosis treatment, the quality of life of some tuberculosis patients is still poorer when compared with the one of the general population (15-17, 20-23, 26-29). The factors associated with the quality of life of the tuberculosis patients can be summarized below:

2.4.2. Socio-demographic characteristics and quality of life

The declined quality of life of the tuberculosis patients may be caused by the socio-demographic characteristics such as age, gender, income, educational level, and marital status. Only a few studies explain the association between the socio-demographic features and the tuberculosis patients' quality of life. The examples of such studies are as follows:

Age : Most of the previous studies indicate that the age is negatively association with the tuberculosis patients' quality of life (16, 21). Namely, the older tuberculosis patients tend to have the lower quality of life when compared with the younger (17, 29). This finding is, however, in contrast with the study of V. Duyan et al. reporting that the age is not association with the quality of life of the tuberculosis patients (24).

Gender : According to most of the previous reports, the gender is association to the quality of life of the tuberculosis patients (16, 29). For instance, women usually have lower average score of the quality of life than the men (14, 15, 25). Such finding is opposite to the study of V. Duyan et al. indicating that the gender is not association with the tuberculosis patients' quality of life (24).

Income : According to the previous studies, the income is firmly association to various domains of the tuberculosis patients' quality of life (21, 32). For example, the score of the tuberculosis patients' quality of life is higher when they have a higher income ($p < 0.001$) (24) whereas the state of being employed is associated with the good quality of life as well (29).

Educational level : The previous reports find that the literate level is associated with the tuberculosis patients' quality of life (29). In other words, the tuberculosis patients' quality of life will be higher if their educational level is higher ($p < 0.05$) (24).

Marital status : The research results of V. Duyan et al. studying the association between the socio-demographics and the tuberculosis patients' quality of life reveal that the single or divorced patients tend to have higher scores of the quality of life than the married patients; however, the difference is not statistically significant (24).

2.4.3. Severity of tuberculosis patients and quality of life

The change of sputum smear results, at the end of the initial phase, from positive to negative is associated with the tuberculosis patients' improved quality of life (22). The patients' quality of life can be also improved by the treatment results (16, 17, 22, 26) as such results reflect the decreased severity of tuberculosis and improved quality of life. This finding is in accord with the study of the quality of life of the patients suffered from other diseases which indicates that the disease severity affects the patients' quality of life (34, 37). However, the study of D. Chamla assessing the tuberculosis patients' quality of life between the control and the treatment groups in Wuhan, China reveals that the sputum smear results are not related to the total SF-36 score ($p > 0.05$) (16).

2.4.4. Categories of patients and quality of life

Based on the previous studies, the score of the quality of life of the patients in each category is statistically-significant different ($F = 4.059$, $p < 0.05$) (24). That is the average score of the tuberculosis patients in Category II is overall lowest in all domains while the average score of the tuberculosis patients in Category I is lower than the one of the patients in Category III with statistical significance (15).

2.4.5. Phase of treatment

The previous studies mentioned that the duration of treatment is negatively associated with the patients' quality of life ($p < 0.01$) (24). Besides, the tuberculosis patient's quality of life obviously varies during and throughout the end of the treatment with the statistical significance (15, 16, 26).

2.4.6. Depression and Quality of life

Despite a few studies on the association between the depression and the tuberculosis patients' quality of life, there is the strong evidence indicating such association. A study on the quality of life among the patients with tuberculosis and HIV co-infection indicates the strong association between the depression and the patients' quality of life. The correlation coefficient between the depression and each domain of the quality of life is from $r = -0.34$ to -0.59 , $p = 0.001$. Moreover, the tuberculosis patients with HIV+ and depression are 8.8 times risky to have lower quality of life when compared with the ones without depression (OR = 8.8, 95% CI : 3.2 – 23) (32). Another research suggests that the depression is negatively associated with the tuberculosis patients' quality of life ($p < 0.05$) (21). At the time the patients are diagnosed with tuberculosis, their depression will be high with lower quality of life (28). The bad feeling caused by the illness mainly affects the patient's quality of life resulting in the patients' lower scores ($p < 0.001$)(24). At the end of the treatment in the sixth month, the patients still indicate the depression and lower quality of life when compared with the general population (26). According to the studies on the quality of life of the patients with other diseases, the depression can increase the overall burden of illness among the patients with chronic medical conditions with statistical significance. The depression in the patients with chronic medical conditions is also associated with the patients' worsened quality of life (35). For instance, the patients with cystic fibrosis exhibit the higher depressive symptoms and poorer quality of life. The correlation coefficient varied from -0.23 to -0.74 . Even stratified and predicted by FEV 1 percent, the association still remains no matter what the lung function status is (34). The results are similar to the ones conducted among the patients with chronic obstructive pulmonary disease. With the multivariate analysis and control of COPD, the COPD patients are suffered from the depression with 3.6 times of the worse respiratory-specific quality of life (OR = 3.6 : 95% CI = 2.7-4.8, $p < 0.001$) and 2.4 times of the overall worse physical quality of life when compared with the patients without depression (OR = 2.4 : 95% CI = 1.8 – 3.2, $p < 0.001$) (36). The studies among the patients with chronic heart failure (CHF) provide the findings similar to the studies conducted among the patients with other chronic diseases. That is, at each level of the CHF severity, the depressed patients' quality of life will be lower than the ones

without depression. The patients' quality of life will be declined when the severity of CHF increases among the patients without depression. However, such association may vary among the patients with depression. This therefore indicates that the interaction effect of the CHF and the depression affects the association between the severity of CHF and the patients' quality of life (37).



CHAPTER III

MATERIAL AND METHODS

3.1 Research design

This is a cross-sectional study aims to determine the association between the depression and the quality of life of tuberculosis patients.

3.2 Study population

The population of this study consisted of the tuberculosis patients who were registered and treated at the tuberculosis clinics of four government hospitals in Khon Kaen Province.

3.3 Inclusion criteria for patients

The pulmonary tuberculosis patients had to be registered as Category I and II. In this research, the categories of patients were organized in compliance with the actual treatment performed by the tuberculosis clinics and registration of tuberculosis patients as follows:

1) Category I means a tuberculosis patient who is treated for the first time. Such patients include the new positive sputum smear cases, and the new negative sputum smear cases.

2) Category II means a tuberculosis patient who has been treated (previous case or retreatment case) including the cases of relapse, treatment after failure, treatment after default.

The minimum age of 18 years. Such patients should be treated at the tuberculosis clinic of the government hospitals in Khon Kaen Province. The volunteer consent was asked before the participation in this study.

3.4 Exclusion criteria for patients

- 3.4.1 The tuberculosis patients referred from the youth and juvenile detention center, the addiction treatment center, prison; and
- 3.4.2 The tuberculosis patients with psychiatric symptoms expect for depression; the ones diagnosed by the clinician as psychiatric patient; the patients who are psychiatrically treated; the patients with aphasia or autism; and
- 3.4.3 The tuberculosis patients with Alzheimer; and
- 3.4.4 The tuberculosis patients who are not Thai; the patients with communication problems; the patients who cannot respond the questionnaire by themselves; and
- 3.4.5 The patients with incomplete data for analysis in this study.

3.5 Data collection period

The data were collected during November 2011 – January 2012.

3.6 Sample size

The objective of this study is to test the association between the depression and the quality of life of pulmonary tuberculosis patients. The statistics used is the correlation coefficient (r). The statistical hypotheses, based on the association between the depression and the pulmonary tuberculosis patients' quality of life, were assumed as follows:

$H_0 : \rho = 0$: The depression is not associated with the quality of life of the pulmonary tuberculosis patients.

$H_1 : \rho \neq 0$: The depression is associated with the quality of life of the pulmonary tuberculosis patients.

The sample size was calculated using the following formula:

$$n = \left[\frac{(Z_{\alpha/2} + Z_{\beta})}{z_r} \right]^2 + 3 \quad (57)$$

whereas

n	=	Sample size
Z_r	=	$0.5 \ln \left[\frac{1+r}{1-r} \right]$
r	=	Pearson correlation coefficient

Since none of the previous studies reports the association between the depression and the pulmonary tuberculosis patients' quality of life, this research was collateral to the reports on the association between the depression and the quality of life of the patients with HIV+ and the patients with tuberculosis plus HIV+. The Kessler's 10 scales and the short Amharic version of the World Health Organization Quality of Life Instrument for HIV clients (WHOQOL HIV) were used as the measurement tool assessing the depression and the patients' quality of life, respectively. It was found that the highest correlation coefficient (r) of the depression and the quality of life of the patients with HIV+ and those with tuberculosis plus HIV+ was -0.59 ($p = 0.001$) for the psychological domain while the lowest correlation

coefficient was -0.34 ($p = 0.001$) for the environmental domain (32). In this study, the correlation coefficient of -0.3 was used for sample size calculation because this will maximize the sample size.

As the two-sided tests with $\alpha = 0.05$ and the power of test at 90%, the sample size was equal to 113 subjects when calculated by the following formula:

$$\begin{aligned} Z_{\alpha/2} &= 1.96 & , & & \text{2-sided : } \alpha &= 0.05 \\ Z_{\beta} &= 1.28 & , & & \text{Power = 90% : } \beta &= 0.1 \\ Z_r &= 0.5 \ln \left[\frac{1+r}{1-r} \right] = 0.5 \ln \left(\frac{1.3}{0.7} \right) &= & 0.3095 \end{aligned}$$

The calculation is thus as below:

$$\begin{aligned} n &= \left[\frac{(Z_{\alpha/2} + Z_{\beta})}{Z_r} \right]^2 + 3 \\ n &= \left[\frac{(1.96 + 1.28)}{(0.3095)} \right]^2 + 3 = 112.59 \approx 113 \end{aligned}$$

As a result, the sample size of this study was 113 subjects.

3.7 Sampling

The following four hospitals, located in Khon Kaen Province were the study sites:

3.7.1 Khon Kaen Hospital is the biggest center hospital located in Muang District, in the east of the province. Most tuberculosis patients in Khon Kaen receive the treatment here. The urban community is observed.

3.7.2 Chum Phae Hospital is located in the west of the main district, about 81 km from Muang District. This is the second-ranked hospital of Khon Kaen that provides the treatment for the tuberculosis patients. The urban community can be observed in the municipality areas while the rural community is found outside the municipality areas.

3.7.3 Nam Phong Hospital is located in the northern district approximately 36 km from Muang District. It provides the treatment for the tuberculosis patients living in the north areas. The urban community and rural community can be observed in and outside the municipality, respectively.

3.7.4 Ban Phai Hospital is located southward in the main district with 47 km distance from Muang District. It is the third-ranked hospital of Khon Kaen that provides the treatment for the tuberculosis patients. The urban community can be observed in the municipality areas while the rural community is found outside the municipality areas.

The data were collected from the patients who were treated at the tuberculosis clinic on the data collection date, during November 2011 – January 2012.

3.8 Research instrument

Questionnaire consisting of two parts as follows:

Part 1: Data related to tuberculosis characteristics in patients

The data were collected from TB 01 and TB 03 Treatment Records to obtain the tuberculosis characteristics of the patients. There are six questions. The respondents should choose the best answer or fill in the related information in the space provided. The data requiring for collection included the tuberculosis treatment records, categories of patients, sputum smear results, chest x-ray results, duration of treatment, and other complications.

Part 2: Data derived from the interview comprising the following three parts:

1) Questionnaire related to demographic characteristics.

There are six questions and the respondents should choose the best answer or fill in the related information in the space provided. The collected variables included age, gender, marital status, educational level, occupation, and family income.

2) PHQ-9 (Patient Health Questionnaire-9).

The data of this part were collected for the assessment of the depression of the respondents using PHQ-9. The PHQ-9, Thai version was translated and verified for its validity and reliability by Lortrakul, M. et al (44). According to the study conducted among 1,000 patients in family practice clinic, Ramathibodi Hospital, Bangkok, The Cronbach's alpha was 0.79 and showed moderate convergent validity with the HAM-D ($r = 0.56$; $P < 0.001$). The categorical algorithm of the PHQ-9 had low sensitivity (0.53) but very high specificity (0.98) and positive likelihood ratio (27.37). Used as a continuous measure, the optimal cut-off score of $\text{PHQ-9} \geq 9$ revealed a sensitivity of 0.84, specificity of 0.77, positive predictive value (PPV) of 0.21, negative predictive value (NPV) of 0.99, and positive likelihood ratio of 3.71. That has acceptable psychometric properties for screening for major depression in general practice with a recommended cut-off score of nine or greater.

The PHQ-9 is the self-administered questionnaire in which the respondents have to choose the best answer that is in accord with their symptoms during the past two weeks. The questionnaire consisted of nine questions derived from the criteria of DSM-IV depression diagnosis. There are four options for each items, ie., None (score of 0), Sometimes (Score of 1), Quite Frequently (Score of 2), and Almost Everyday (Score of 3). The total score might be from 0 to 27. Patient having the score at least 9 can be categorized as depression. In addition, the PHQ-9 can indicate the severity of depression by the level of score as shown in Table 3.1.

Table 3.1 The interpretation of scores obtained from PHQ-9 (58)

Total Score	Fundamental Diagnosis
0 – 4	No symptom
5 – 8	Minor symptoms but not the major depression
9 – 14	Major depression, mild, or dysthymia
15 – 19	Major depression, moderate
20 – 27	Major depression, severe

3) WHOQOL – BREF. (59)

The data related to the respondents' quality of life in this part were collected by the use of WHOQOL–BREF which was developed from WHOQOL-100. Such measurement tool was translated into 19 languages including Thai language whereas its validity was verified by the WHOQOL Group, Program on Mental Health, World Health Organization (45, 56). The consistency between the WHOQOL-100 and WHOQOL–BREF are very high as the correlation coefficient is from 0.89 (Domain 3) to 0.95 (Domain 1). WHOQOL–BREF also indicates a good internal consistency with the Cronbach's alpha between 0.66 (Domain 3) and 0.84 (Domain 1). The study on the validity of WHOQOL-BREF among the population with different characteristics such as the measurement on the quality of life between the patients and the healthy ones, indicates that the scores of the quality of life by the both groups are significantly

different all of domains. Thus, it can be mentioned that WHOQOL-BREF can be properly used to assess the tuberculosis patients' quality of life in this current research.

The WHOQOL-BREF comprises 26 questions; one question from each of the 24 sections of WHOQOL-100 plus two questions from the sections of the quality of life and the general health. WHOQOL-BREF is divided into the four domains as below:

- **Domain 1 : Physical health domain** consisting of seven questions – Question No. 3, 4, 10, 15, 16, 17, 18
- **Domain 2 : Psychological domain** consisting of six questions – Question No. 5, 6, 7, 11, 19, 26
- **Domain 3 : Social relationships domain** consisting of three questions – Question No. 20, 21, 22
- **Domain 4 : Environmental domain** consisting of eight questions – Question No. 8, 9, 12, 13, 14, 23, 24, 25

The WHOQOL-BREF measurement tool comprises 23 positive questions plus three negative questions, namely, Question No. 3, 4, 26. The five-scale rating was used as described in Table 3.2.

Table 3.2 Rating criteria used for the assessment of the quality of life

	- Strongly bad	- Bad - Dissatisfied	- Moderate - Indifferent	- Good - Satisfied	- Very good - Highly satisfied
Choices (Answer)	- Strongly dissatisfied	- Little - Seldom	- Quite frequently	- High - Often - Very often	- Highest - Complete - All the times
Positive questions	1 point	2 points	3 points	4 points	5 points
Negative questions (Question No. 3, 4, 26)	5 points	4 points	3 points	2 points	1 point

Scoring of WHOQOL-BREF (45)

The quality of life was considered based on the four domains. Two questions were, however, separated. The first question is about the perception of one's quality of life while the second one is related to the perception of one's health. The scores from the four domains indicate the quality of life of the research participants. The score of each domain is positive-direction based. The higher the score is, the higher is the quality of life. The score of WHOQOL-100 can be calculated by converting the raw scores. For the first conversion, the scores converted during 4-20 points were compared to the WHOQOL-100 whereas in the second conversion, the scores were converted for each domain with the range of 0-100 points. By this research, the second-conversion scores or the transformed scores exhibited in Table 3.3 were used to interpret the results of the quality of life and analyze the data as follows:

Table 3.3 Method for converting raw scores to transformed scores (45)

DOMAIN 1			DOMAIN 2			DOMAIN 3			DOMAIN 4		
Raw Score	Transformed scores		Raw score	Transformed scores		Raw score	Transformed scores		Raw score	Transformed scores	
	4-20	0-100		4-20	0-100		4-20	0-100		4-20	0-100
7	4	0									
8	5	6									
9	5	6									
10	6	13									
11	6	13									
12	7	19									
13	7	19									
14	8	25									
15	9	31									
16	9	31									
17	10	38									
18	10	38									
19	11	44									
20	11	44									
21	12	50									
22	13	56									
23	13	56									
24	14	63									
25	14	63									
26	15	69									
27	15	69									
28	16	75									
29	17	81									
30	17	81									
31	18	88									
32	18	88									
33	19	94									
34	19	94									
35	20	100									
6	4	0									
7	5	6									
8	5	6									
9	6	13									
10	7	19									
11	7	19									
12	8	25									
13	9	31									
14	9	31									
15	10	38									
16	11	44									
17	11	44									
18	12	50									
19	13	56									
20	13	56									
21	14	63									
22	15	69									
23	15	69									
24	16	75									
25	17	81									
26	17	81									
27	18	88									
28	19	94									
29	19	94									
30	20	100									
3	4	0									
4	5	6									
5	7	19									
6	8	25									
7	9	31									
8	11	44									
9	12	50									
10	13	56									
11	15	69									
12	16	75									
13	17	81									
14	19	94									
15	20	100									
8	4	0									
9	5	6									
10	5	6									
11	6	13									
12	6	13									
13	7	19									
14	7	19									
15	8	25									
16	8	25									
17	9	31									
18	9	31									
19	10	38									
20	10	38									
21	11	44									
22	11	44									
23	12	50									
24	12	50									
25	13	56									
26	13	56									
27	14	63									
28	14	63									
29	15	69									
30	15	69									
31	16	75									
32	16	75									
33	17	81									
34	17	81									
35	18	88									
36	18	88									
37	19	94									
38	19	94									
39	20	100									
40	20	100									

3.9 Data collection

The data were collected with the following procedures:

3.9.1 The ethics for research involving human research subjects was approved by the Ethics Review Committee for Research Involving Human Research Subjects, Siriraj Institutional Review Board, Faculty of Medicine Siriraj Hospital, Mahidol University;

3.9.2 The researcher coordinated with the contact persons responsible for the tuberculosis control in provincial and district levels in the four district where the data would be collected;

3.9.3 Before the data collection, the reasons and objectives of this research was explained by the researcher to the stakeholders;

3.9.4 The participating patients signed in the consent form;

3.9.5 The data were collected from the tuberculosis patients receiving the treatment at the tuberculosis clinic in the four hospitals upon the considering on the inclusion criteria and exclusion criteria, and signing in the consent form of the subjects. Part 1 of the questionnaire is derived from the tuberculosis treatment records of TB 01 or TB 03. The subjects responded Part 2 of the questionnaire which consists of three sections, namely, the demographic characteristics, PHQ-9, Thai version, and WHOQOL-BREF, Thai version;

3.9.6 The completeness and correctness of the data were verified before the data collection and data analysis, respectively.

3.10 Data Analysis

The data were verified before the statistical analysis using the statistical significance level $\alpha = 0.05$.

3.10.1 Descriptive statistics

3.10.1.1 Frequency, percentage to describe the qualitative data such as gender, educational level, occupation, income, marital status, severity of tuberculosis, and categories of patients, phase of treatment, depression.

3.10.1.2 Average, standard deviation, mean, median, maximum, minimum to describe the quantitative data of age, income, phase of treatment, depression and scores of quality of life

3.10.2 Inferential statistics

3.10.2.1 Determine the correlation between the score of depression and the score of quality of life (outcome) by Spearman rank correlation (r).

3.10.2.2 Determine the association between other qualitative independent variables and the score of quality of life.

- Two sample t-test for the independent variables with two groups such as gender, education level, income, categories of patients, severity of tuberculosis, phase of treatment and depression.

- One-way ANOVA for the independent variables with more than two groups such as age, marital status, occupation and co-variables (phase of treatment and depression).

3.10.2.3 Determine the association between the score of quality of life (Outcome: y) and the independent variables (Predictor: x) such as depression, categories of patients, severity of tuberculosis, duration of treatment, gender, age, income, marital status by multiple linear regression.

CHAPTER IV

RESULTS

The objective of this study was to assess the effects of depression on quality of life among adults with pulmonary tuberculosis in Khon Kaen province. One hundred and thirty cases of pulmonary tuberculosis were included but 113 cases had completed data for analysis. The number of patients in each of 4 hospitals was displayed in Table 4.1

Table 4.1 Distribution of 113 pulmonary tuberculosis patients in 4 hospitals

Hospital	Number (%)
Khon Kaen	27 (23.9)
Chum Phae	26 (23.0)
Ban Phai	31 (27.4)
Nam Phong	29 (25.7)

The results of this study were divided into 3 parts as follows.

1. General and demographic characteristics.
2. Univariate analysis to determine the association between each factor and quality of life i.e., 2-sample t-test, 1-way ANOVA and Chi-square test.
3. Multivariate analysis using multiple linear regression analysis to assess the association between depression and quality of life in pulmonary tuberculosis patients, while adjusting for other factors.

4.1 Demographic and clinical characteristics

4.1.1 Demographic characteristics

Table 4.2 displayed age, sex, marital status, education level, occupation, family income of pulmonary tuberculosis patients. Patient's age varied from 21 to 86 years with mean of 54.1 (SD=16.2). About 67% of patients were male. Most of the patients (71.7%) were married whereas only 11.5% were single. Only 33.6% had education higher than primary school. About half of the patients (46%) worked on agriculture, 26.6% were workers, 17.7% were unemployed and the remaining 9.7% worked for government and business sectors. About 40% had monthly income greater than 5,000 baht.

Table 4.2 Demographic characteristics of 113 pulmonary tuberculosis patients

Characteristics	Number (%) or Mean \pm SD (Min - Max)
Age (years)	54.1 \pm 16.2 (21- 86)
21 – 40	26 (23.0)
41 – 60	45 (39.8)
>60	42 (37.2)
Gender	
Male	76 (67.3)
Female	37 (32.7)
Marital status	
Single	13 (11.5)
Married	81 (71.7)
Widowed/ Separated and divorced	19(16.8)
Education level	
\leq Primary school	75 (66.4)
> Primary school	38 (33.6)
Occupation	
Unemployment	20 (17.7)
Agriculturists/Others	52 (46.0)
Manual workers	30 (26.6)
Government office / Office employee/Vendor	11 (9.7)
Family income (Baht/month): Median (Min-Max)	5,000 (0 - 40,000)
\leq 5,000	67 (59.3)
> 5,000	46 (40.7)

4.1.2 Clinical characteristics

Severity of tuberculosis, category of tuberculosis patients and phase of treatment were displayed in Table 4.3. Majority of patients (65.5%) had severe pulmonary tuberculosis. Regarding category of tuberculosis, 93.8% were new cases (category I) whereas the other 6.2% were in category 2 (e.g., relapse, treatment after default). For phase of treatment, 71.7% were in intensive phase and the remaining 28.3% were in continuation phase. Duration of treatment varied from 1 to 371 days with the mean \pm SD of 115 ± 73 .

Table 4.3 Clinical characteristics of 113 pulmonary tuberculosis patients

Characteristics	Number (%) or Mean \pm SD (Min - Max)
Severity of tuberculosis at first visit	
Severe	74 (65.5)
Less severe	39 (34.5)
Category of tuberculosis patients	
I: New case	106 (93.8)
II: Retreatment case	7 (6.2)
Relapse	2 (1.8)
Treatment after default	3 (2.6)
Other	2 (1.8)
Duration of treatment (days)	115 \pm 73 (1- 371)
Phase of treatment	
Intensive phase	32 (28.3)
Continuation phase	81 (71.7)

4.1.3 Depression

The depression score varied from 0 to 15 with the mean \pm SD of 4.70 ± 4.03 (Figure 4.1). Categorization of total PHQ-9 score into groups revealed that 19.5% and 0.9% had mild and moderate depression respectively (Table 4.4). Using a cut-off point at least 9 points as depression, 23 cases (20.4%) had depression whereas the other 90 cases (79.6%) had no depression.

Figure 4.1 Distribution of depression score in 113 pulmonary tuberculosis patients

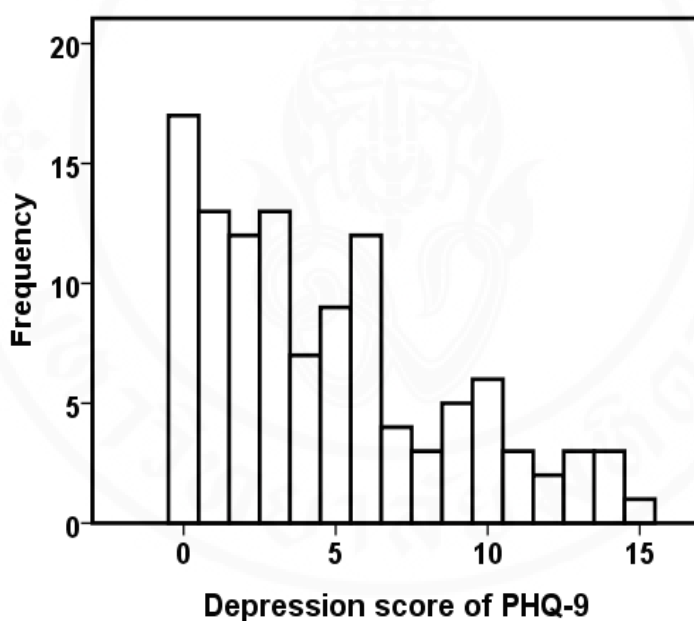


Table 4.4 Interpretation of PHQ-9 scores obtained from 113 pulmonary tuberculosis patients

Total Score	Fundamental Diagnosis	Number (%)
0 - 4	No symptom	62 (54.8)
5 - 8	Minor symptoms but not the major depression	28 (24.8)
9 - 14	Major depression, mild, or dysthymia	22 (19.5)
15 - 19	Major depression, moderate	1 (0.9)
20 - 27	Major depression, severe	0

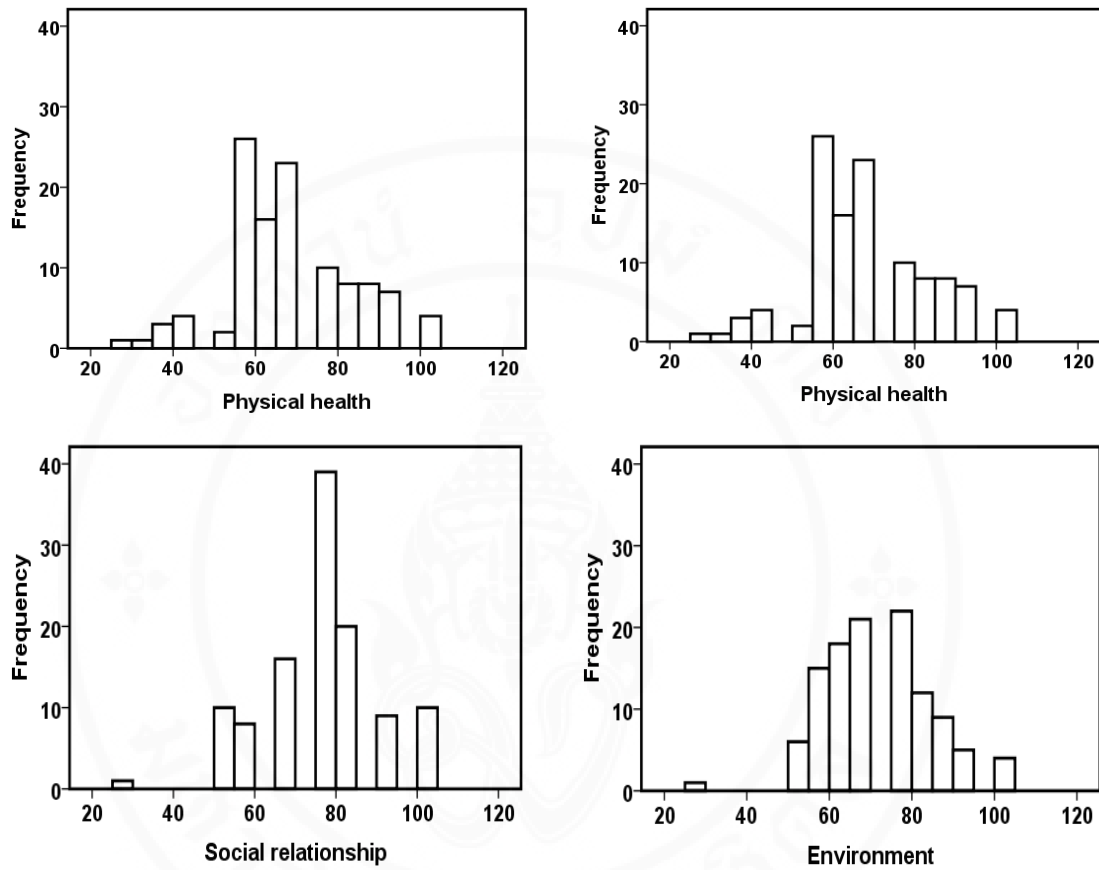
4.1.4 Quality of Life.

Quality of life assessed by WHOQOL-BREF consisted of 4 domains: domain 1 (physical health), domain 2 (psychological health), domain 3 (social relationship) and domain 4 (environment health). Table 4.5 displayed raw and transformed scores of quality of life in each domain. Since the maximum values of raw score differed, they were transformed to have the same range of 0 to 100 (45). Based on transformed scores, patients had poorer physical and environmental health (mean of 67.8 and 71.1 respectively) than psychological health and social relationship (mean of 75.7 and 74.9 respectively). Figure 4.2 showed the distribution of transformed scores from each quality of life domain which looked normally distributed.

Table 4.5 Quality of life of 113 pulmonary tuberculosis patients

Quality of life	Mean \pm SD (Min - Max)	
	Raw score	Transformed score (0-100)
Domain 1 Physical health	25.9 \pm 4.3 (14 – 35)	67.8 \pm 15.5 (25 – 100)
Domain 2 Psychological health	24.1 \pm 3.1 (15 – 30)	75.7 \pm 12.8 (38 – 100)
Domain 3 Social relationship	12.0 \pm 1.7 (6 – 15)	74.9 \pm 14.2 (25 – 100)
Domain 4 Environment	30.2 \pm 4.2 (16 – 40)	71.1 \pm 13.2 (25 – 100)

Figure 4.2 Distribution of each domain of quality of life



4.2 The correlation between the depression score and quality of life

Figure 4.3 displayed the scatter plot of depression score and transformed quality of life score from each domain. Since depression score was positively skewed (Figure 4.1), Spearman rank correlation (r_s) was employed to assess correlation between depression score and quality of life score in each domain. All correlation coefficients were negative showing the more depression, the poorer quality of life (Table 4.6). Correlation coefficient varied from -0.15 (for social relationship) to -0.54 (for physical health) indicating a rather poor negative correlation between depression and quality of life.

Figure 4.3 Scatter plot of depression score and quality of life score

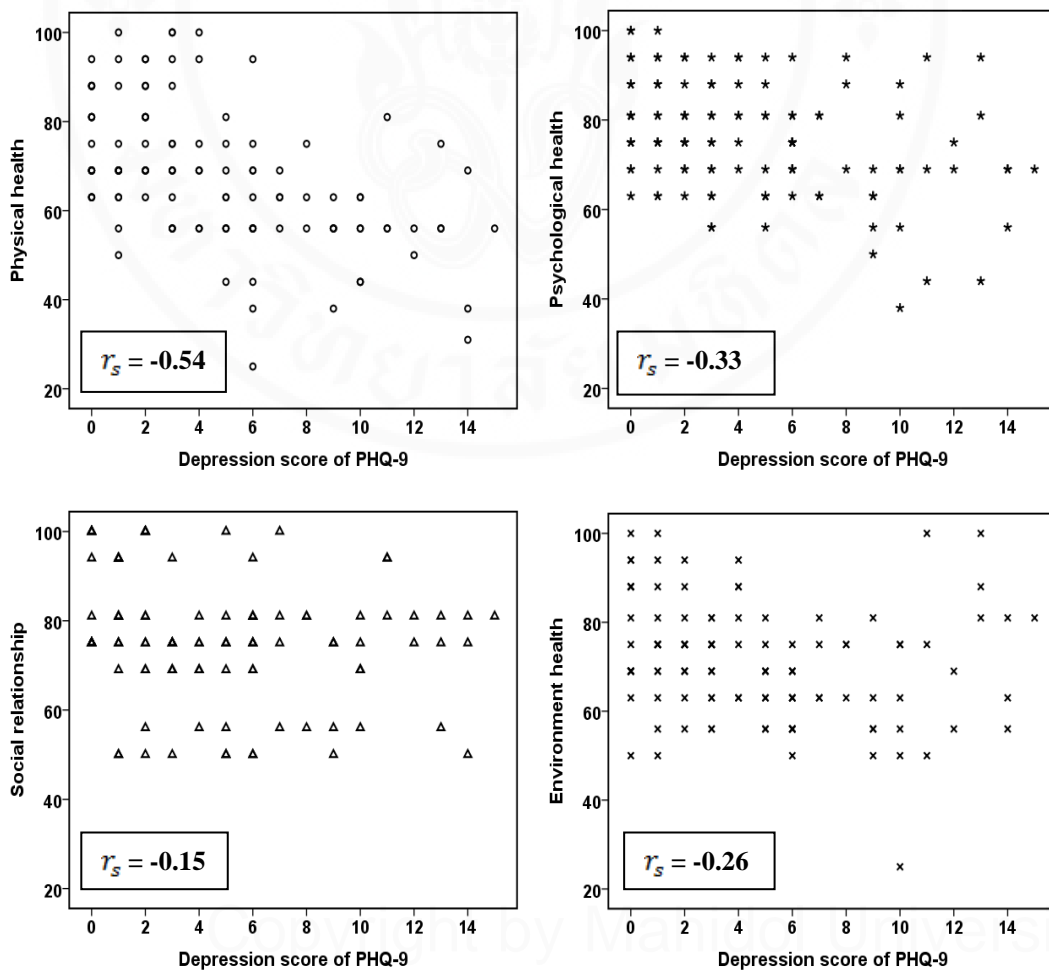


Table 4.6 Spearman rank correlation (r_s) between depression and quality of life

	Quality of life Domain: r_s (95% CI)			
	Physical health	Psychological health	Social relationship	Environment health
Depression	-0.54	-0.33	-0.15	-0.26
	(-0.65, -0.40)	(-0.48, -0.14)	(-0.33, 0.05)	(-0.44, -0.06)
	p<0.001	p<0.001	p=0.119	p=0.006

4.3 Factors associated with quality of life by univariate analysis

Since having or not having depression was of more interest to clinicians than depression score, depression was used as a binary variable in the following analyses.

4.3.1 Quality of life on Domain 1: Physical health

Table 4.7 showed the association between each factor and patients' physical health. Factors associated with physical health were age and depression. Regarding age, younger patients had better physical health than older patients (mean of 73.0, 70.1, 62.1 for age group 21-40, 41-60, >60 years respectively). Patients aged more than 60 years had significantly poorer physical health than those aged 21-40 and 41-60 years. For depression, patients with depression had much poorer physical health than those without depression (mean of 55.4 vs. 70.9, p<0.001).

Different occupation seemed to have different physical health (p=0.066). Patients working for government, business sector had the best physical health whereas those without job had the poorest physical health (mean of 77.5 vs. 62.9). With regard to family income, patients with income greater than 5,000 baht per month seemed to have better physical health than those with income less than 5,000 baht (mean of 70.3 vs. 66.0, p=0.156).

There was no association between physical health and gender, marital status, level of education ($p>0.2$). Severity of tuberculosis at first visit was not related to physical health at the time of the study ($p=0.56$). Category of tuberculosis patients was also not related to physical health ($p=0.97$).

Regarding phase of treatment, pulmonary tuberculosis patients in intensive phase had similar physical health to those in continuation phase (68.3 vs. 67.6, $p=0.834$). Since having depression caused low quality of life, it was of interest to see whether the effect of depression on quality of life depended on phase of treatment and on the other hand, whether the effect of phase of treatment on quality of life depended on depression. This was to test if there was an interaction between depression and phase of treatment. This interaction could easily be examined via one new variable comprising both depression and phase of treatment.

As shown in Table 4.8 and Figure 4.4, this new variable with 4 categories was associated with physical health. To determine the effect of depression after controlling for treatment phase, effect of depression was explored separately for each treatment phase. That was, when patients were in intensive treatment phase, having also depression caused much poorer physical health (a drop of 24.9 scores) than not having depression (mean: 48.0 vs. 72.9). However, for patients in continuation treatment phase, having also depression was related to drop of only 12.0 scores of physical health compared to no depression (mean: 58.1 vs. 70.1).

Similarly, to test the effect of treatment phase after controlling for effect of depression, effect of treatment phase was assessed among patients with and without depression separately. It revealed that if the patients without depression, being in either intensive or continuation phase had no impact on physical health (mean: 72.9 vs. 70.1). However, for patients with depression, being in intensive phase was related to a drop of as high as 10.1 scores compared to continuation phase (mean: 48 vs. 58.1).

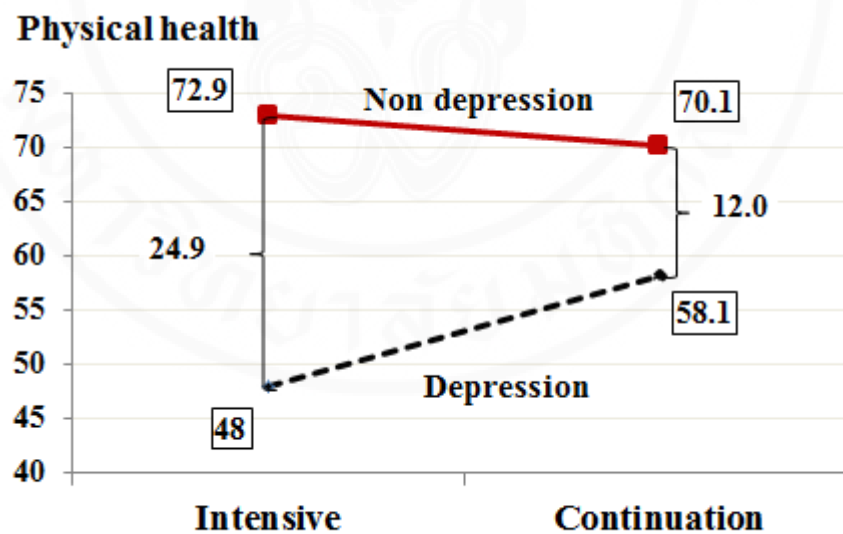
In summary for physical health, there seemed to be an interaction between depression and phase of treatment.

Table 4.7 Factors associated with physical health: univariate analysis

Variables	n	Mean ± SD	p-value
Age (yrs)			
21 – 40	26	73.0 ± 15.7	0.007
41 – 60	45	70.1 ± 15.4	
> 60	42	62.1 ± 13.9	
Gender			
Men	76	69.0 ± 16.2	0.235
Woman	37	65.3 ± 13.8	
Marital Status			
Single	13	73.6 ± 18.4	0.265
Couple	81	67.6 ± 15.5	
Widowed/ Divorced	19	64.6 ± 12.7	
Education level			
≤ Primary school	75	67.5 ± 15.6	0.818
> Primary school	38	68.2 ± 15.6	
Occupation			
No	20	62.9 ± 14.8	0.066
Agriculture/Others	52	66.5 ± 13.5	
Employment	30	69.7 ± 17.5	
Government office /Office employee/ Business	11	77.5 ± 17.2	
Family income (Baht/month)			
≤ 5,000	67	66.0 ± 14.7	0.156
> 5,000	46	70.3 ± 16.4	
Category of tuberculosis patients			
New case	106	67.7 ± 15.5	0.967
Retreatment case	7	68.0 ± 15.9	
Severity of tuberculosis at first visit			
Severe	74	68.4 ± 17.0	0.562
Less severe	39	66.6 ± 12.2	
Phase of treatment			
Intensive	32	68.25 ± 15.51	0.834
Continuation	81	67.57 ± 15.58	
Depression			
Non depression	90	70.9 ± 14.9	<0.001
Depression	23	55.4 ± 11.5	

Table 4.8 Effect of phase of treatment and depression on physical health

		Physical health		
		n	Mean \pm SD	p-value
Intensive,	Depression (1)	6	48.0 \pm 9.0	<0.001
Intensive,	No depression (2)	26	72.9 \pm 12.7	p-value<0.05 for 1 vs. 2, 1 vs. 4
Continuation,	Depression (3)	17	58.1 \pm 11.3	
Continuation,	No depression (4)	64	70.1 \pm 15.7	3 vs. 2, 3 vs. 4

Figure 4.4 Examining interaction between depression and treatment phase on physical health

4.3.2 Quality of Life on Domain 2: Psychological health.

Table 4.9 showed the association between each factor and patients' psychological health. Factors associated with psychological health were phase of treatment and depression. Regarding phase of treatment, patients in intensive phase of treatment had significantly poorer psychological health than patients in continuation phase of treatment (mean of 71.8 vs. 77.3, $p = 0.041$). Also, patients with depression had much poorer psychological health than those without depression (mean of 66.7 vs. 78.0, $p < 0.001$).

Different age seemed to have different psychological health ($p = 0.173$). Younger patients had better psychological health than older patients (mean of 78.3, 77.0, 72.9 for age group 21-40, 41-60, >60 years respectively). Patients aged more than 60 years had poorer psychological health than those aged 21-40 and 41-60 years. With regard to family income, patients with income greater than 5,000 baht per month seemed to have better psychological health than those with income less than 5,000 baht (mean of 77.7 vs. 74.4, $p = 0.185$).

There was no association between psychological health and gender, marital status, level of education, occupation ($p > 0.2$). Severity of tuberculosis at first visit was not related to psychological health at the time of the study ($p = 0.48$). Category of tuberculosis patients was not related to physical health ($p = 0.50$).

When phase of treatment and depression were considered together as one variable with 4 categories, (Table 4.10 and Figure 4.5), this variable was associated with psychological health. Among patients in intensive treatment phase, having depression was related to 13.7 points less psychological health than those without depression (mean: 60.7 vs. 74.4). Similarly, for patients in continuation phase, depression was related to a drop of quality of life 10.6 points (mean: 68.9 vs. 79.5).

For patients without depression, receiving intensive treatment was related to a drop of only 5.1 scores compared to continuation phase (mean: 74.4 vs. 79.5). Similarly, among patients with depression, receiving intensive treatment was associated with a drop of 8.2 scores (mean: 60.7 vs. 68.9).

In summary, for psychological health, there seemed to be no interaction between depression and phase of treatment.

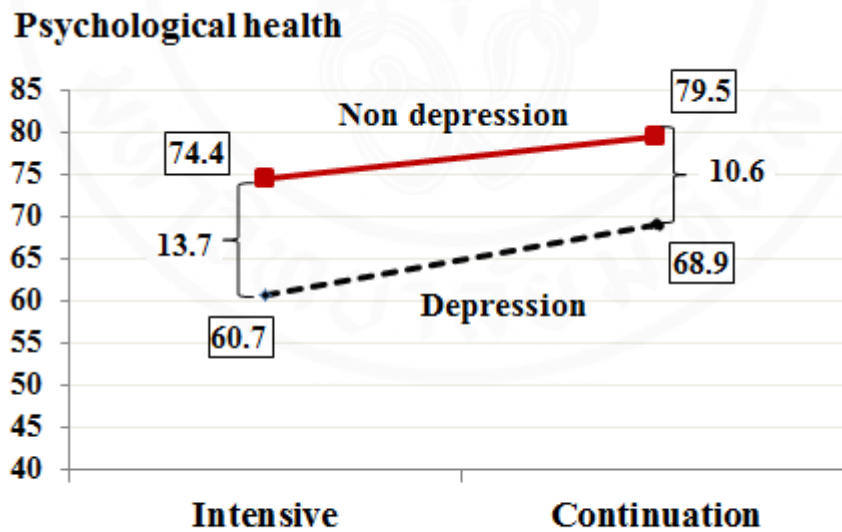
Table 4.9 Factors associated with psychological health: univariate analysis

Variables	n	Mean ± SD	p-value
Age (yrs)			
21 – 40	26	78.3 ± 12.2	0.173
41 – 60	45	77.0 ± 12.4	
> 60	42	72.9 ± 13.3	
Gender			
Men	76	76.3 ± 13.3	0.498
Woman	37	74.6 ± 11.8	
Marital Status			
Single	13	78.1 ± 12.2	0.375
Couple	81	76.2 ± 12.2	
Widowed/ Divorced	19	72.2 ± 15.6	
Education level			
≤ Primary school	75	75.2 ± 13.4	0.539
> Primary school	38	76.8 ± 11.6	
Occupation			
Unemployment	20	70.8 ± 17.5	0.248
Agriculturists/Others	52	77.3 ± 10.9	
Manual workers	30	75.6 ± 12.6	
Government office / Office employee/ Vendor	11	78.0 ± 11.1	
Family income (Baht/month)			
≤ 5,000	67	74.4 ± 13.7	0.185
>5000	46	77.7 ± 11.3	
Category of tuberculosis patients			
New case	106	75.9 ± 12.5	0.501
Retreatment case	7	72.6 ± 17.9	
Severity of tuberculosis at first visit			
Severe	74	75.1 ± 13.2	0.480
Less severe	39	76.9 ± 12.1	
Phase of treatment			
Intensive	32	71.8 ± 11.3	0.041
Continuation	81	77.3 ± 13.1	
Depression			
Non depression	90	78.0 ± 11.2	<0.001
Depression	23	66.7 ± 15.0	

Table 4.10 Effect of phase of treatment and depression on psychological health

		n	Psychological health	
			Mean ± SD	p-value
Intensive,	Depression (1)	6	60.7 ± 11.0	p-value<0.05 for 1 vs. 4, 3 vs. 4
Intensive,	No depression (2)	26	74.4 ± 9.9	
Continuation,	Depression (3)	17	68.9 ± 15.9	
Continuation,	No depression (4)	64	79.5 ± 11.4	

Figure 4.5 Examining interaction between depression and treatment phase on psychological health



4.3.3 Quality of Life on Domain 3 : Social relationship.

Table 4.11 showed the association between each factor and patients' social relationship. Factors seemed to be associated with social relationship were phase of treatment and family income. Regarding phase of treatment, patients in intensive phase of treatment had poorer social relationship than patients in continuation phase of treatment (mean of 71.1 vs. 76.5, $p>0.05$). With regard to family income, patients with income greater than 5,000 baht per month seemed to have better social relationship than those with income less than 5,000 baht (mean of 77.2 vs. 73.4, $p>0.05$).

There was no association between social relationship and age, gender, marital status, level of education, occupation ($p>0.2$). Severity of tuberculosis at first visit was not related to social relationship at the time of the study ($p=0.392$). Category of tuberculosis patients was not related to physical health ($p=0.33$)

When phase of treatment and depression were considered together as one variable with 4 categories, (Table 4.12, Figure 4.6), this variable seemed to be associated with social relationship ($p>0.05$). Among patients in intensive phase, having also depression caused a drop of 8.1 scores in social relationship (mean: 64.5 vs. 72.6). However, for patients in continuation phase, having or not having depression was not related to social relationship (mean: 75.7 vs. 76.7).

For patients without depression, being in intensive phase caused only a 4.1 social relationship scores less than in continuation phase (mean: 72.6 vs. 76.7). However, for patients with depression, being in intensive phase was related to a drop of as high as 11.2 scores (mean: 64.5 vs. 75.7).

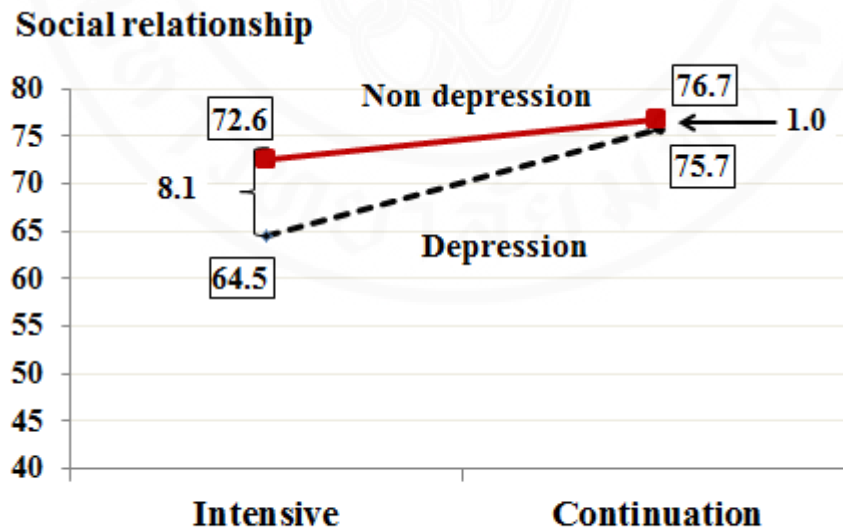
Therefore, depression and phase of treatment seemed to have little effect on patients' social relationship.

Table 4.11 Factors associated with social relationship: univariate analysis

Variables	n	Mean ± SD	p-value
Age (yrs)			
21 – 40	26	77.0 ± 15.9	0.711
41 – 60	45	74.3 ± 13.7	
> 60	42	74.4 ± 13.7	
Gender			
Men	76	74.1 ± 15.5	0.631
Woman	37	74.5 ± 11.2	
Marital Status			
Single	13	73.6 ± 12.3	0.788
Couple	81	75.5 ± 14.7	
Widowed/ Divorced	19	73.4 ± 13.5	
Education level			
≤ Primary school	75	74.9 ± 14.3	0.974
> Primary school	38	75.0 ± 14.0	
Occupation			
Unemployment	20	75.6 ± 13.1	0.744
Agriculturists/Others	52	75.9 ± 15.1	
Manual workers	30	72.5 ± 14.4	
Government office / Office employee/ Vendor	11	76.2 ± 11.2	
Family income (Baht/month)			
≤ 5,000	67	73.4 ± 14.8	0.169
> 5,000	46	77.2 ± 13.1	
Category of tuberculosis patients			
New case	106	75.5 ± 13.3	0.330
Retreatment case	7	66.0 ± 23.6	
Severity of tuberculosis at first visit			
Severe	74	75.8 ± 15.7	0.392
Less severe	39	73.4 ± 10.8	
Phase of treatment			
Intensive	32	71.1 ± 15.2	0.067
Continuation	81	76.5 ± 13.5	
Depression			
Non depression	90	75.5 ± 14.6	0.416
Depression	23	72.8 ± 12.2	

Table 4.12 Effect of phase of treatment and depression on social relationship

		n	Social relationship	
			Mean \pm SD	p-value
Intensive,	Depression (1)	6	64.5 \pm 14.0	0.172
Intensive,	No depression (2)	26	72.6 \pm 15.3	
Continuation,	Depression (3)	17	75.7 \pm 10.4	
Continuation,	No depression (4)	64	76.7 \pm 14.3	

Figure 4.6 Examining interaction between depression and treatment phase on social relationship

4.3.4 Quality of Life on Domain 4 Environment.

Table 4.13 showed the association between each factor and patients' environment. All of factors such as age, gender, marital status, education level, occupation, family income, Category of tuberculosis, severity of tuberculosis, phase of treatment and depression were not found to be significantly associated with patients' environment (p -value > 0.2).

When phase of treatment and depression were considered together as one variable with 4 categories, (Table 4.14, Figure 4.7), this variable was not associated with ($p=0.646$). For patients in intensive treatment phase, having or not having depression had no impact on environment (mean: 70.8 vs. 72.5). Similarly, for patients in continuation phase, having depression caused a little drop of 5.6 scores of environment (mean: 66.2 vs. 71.8). Thus, for environment, there seemed to be no effect of depression and phase of treatment.

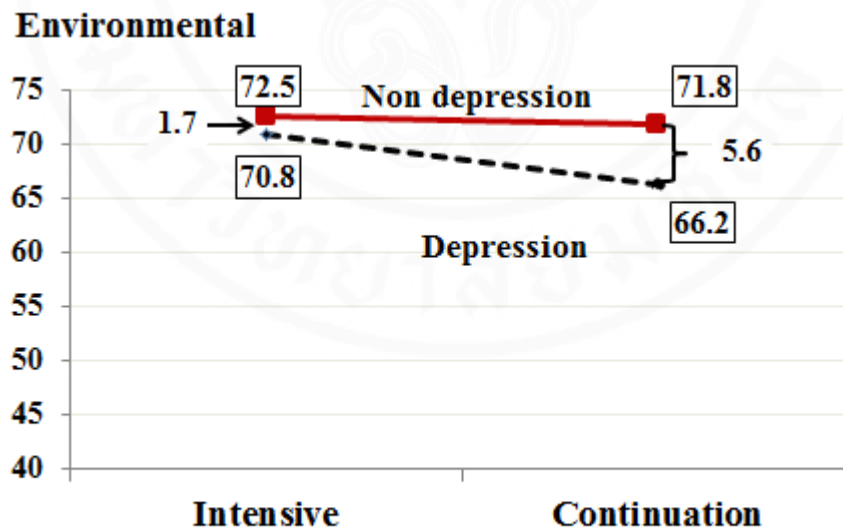
Table 4.13 Factors associated with environment: univariate analysis

Variables	n	Mean \pm SD	p-value
Age (yrs)			
21 – 40	26	69.8 \pm 12.2	0.729
41 – 60	45	72.2 \pm 14.2	
> 60	42	70.6 \pm 12.8	
Gender			
Men	76	71.4 \pm 13.9	0.684
Woman	37	70.4 \pm 11.9	
Marital Status			
Single	13	69.3 \pm 11.8	0.394
Couple	81	72.1 \pm 12.5	
Widowed/ Divorced	19	67.8 \pm 16.8	
Education level			
\leq Primary school	75	70.9 \pm 13.3	0.834
> Primary school	38	71.5 \pm 13.3	
Occupation			
Unemployment	20	73.9 \pm 14.4	0.369
Agriculturists/Others	52	72.0 \pm 12.4	
Manual workers	30	67.6 \pm 14.2	
Government office / Office employee/ Vendor	11	71.1 \pm 11.6	
Family income (Baht/month)			
\leq 5,000	67	70.2 \pm 13.8	0.368
>5000	46	72.4 \pm 12.4	
Category of tuberculosis patients			
New case	106	71.3 \pm 12.6	0.418
Retreatment case	7	67.1 \pm 21.3	
Severity of tuberculosis at first visit			
Severe	74	71.9 \pm 14.1	0.347
Less severe	39	69.5 \pm 11.3	
Phase of treatment			
Intensive	32	72.2 \pm 12.0	0.567
Continuation	81	70.6 \pm 13.7	
Depression			
Non depression	90	72.0 \pm 11.7	0.244
Depression	23	67.4 \pm 17.7	

Table 4.14 Effect of phase of treatment and depression on environment

		n	Environmental health	
			Mean ± SD	p-value
Intensive,	Depression (1)	6	70.8 ± 18.4	0.646
Intensive,	No depression (2)	26	72.5 ± 10.5	
Continuation,	Depression (3)	17	66.2 ± 17.9	
Continuation,	No depression (4)	64	71.8 ± 12.3	

Figure 4.7 Examining interaction between depression and treatment phase on environment



4.4 Association between depression and quality of life after controlling other confounders.

The previous section displayed the univariate analysis of each domain of quality of life i.e., association between each factor and quality of life. Factors with univariate p-value less than 0.2 and factors of main interest (i.e., phase of treatment, depression) would be candidates for multivariate analysis via multiple linear regression. Since occupation and family income were related, only family income was included in multiple linear regression analysis because family income could be easily interpreted. Table 4.15 summarized the univariate analysis of each domain of quality of life. Figure 4.8 was the same as Figures 4.4 to 4.7 but shown together to be able to compare the effect of depression and phase of treatment on each domain of quality of life.

To be able to compare effect of each factor on each domain of quality of life, the four multiple linear regression models of quality of life would include the same independent variables i.e., age (≤ 40 , 41-60, >60), family income (≤ 5000 , >5000) and phase of treatment and depression (Intensive + Depression, Intensive + No depression, Continuation + Depression, Continuation + No depression).

Table 4.15 Summary of univariate analysis of each domain of quality of life

Variable	Domain of quality of life: p-value			
	1	2	3	4
Age (≤ 40 , 41-60, >60)	0.007	0.173	0.711	0.729
Gender (M, F)	0.235	0.498	0.631	0.684
Occupation (4 groups)	0.066	0.248	0.744	0.369
Family income (≤ 5000 , >5000)	0.156	0.185	0.169	0.368
Phase of treatment and depression (Intensive + Depression, Intensive + No depression, Continuation + Depression, Continuation + No depression)	< 0.001	< 0.001	0.172	0.646

Domain 1, 2, 3, 4 were physical health, psychological health, social relationship, environment respectively.

Figure 4.8 The interaction between depression and phase of treatment on quality of life

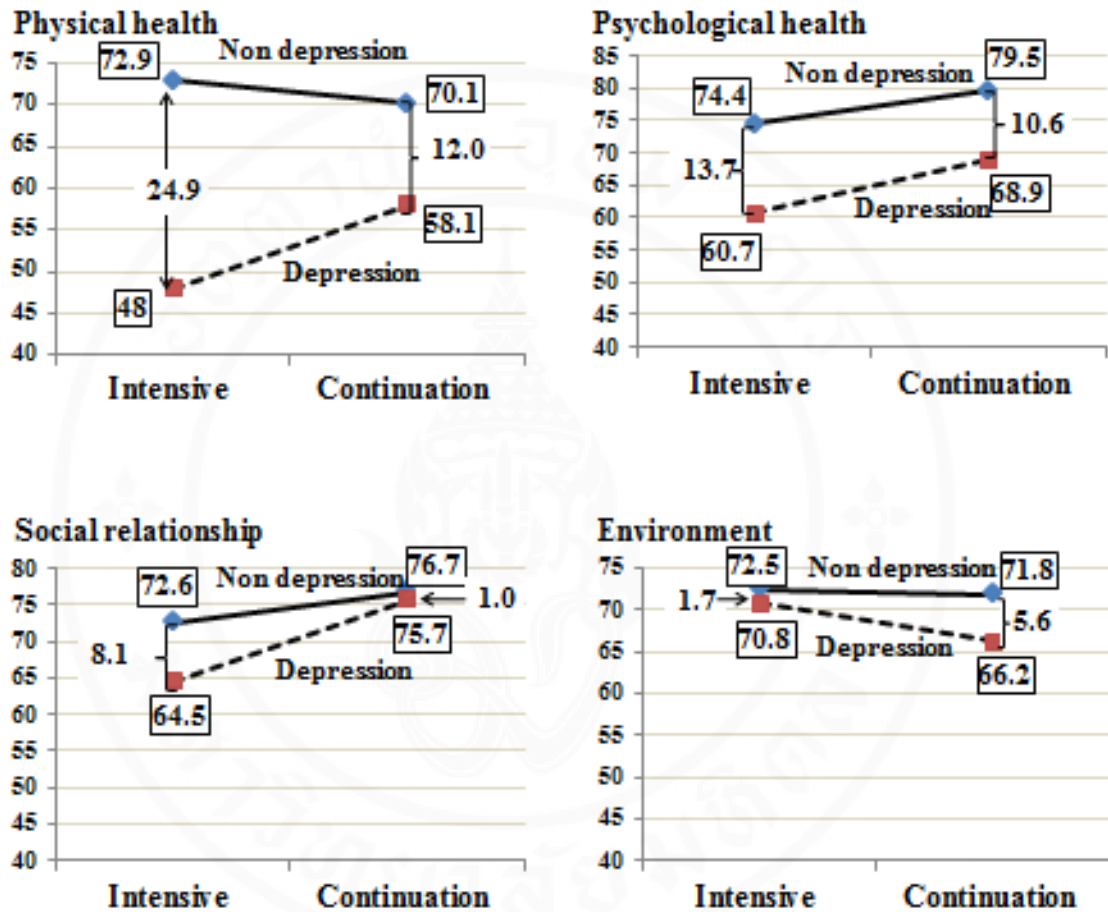


Table 4.16 displayed the results of multiple linear regression for each domain of quality of life on 3 independent variables i.e., age group, family income group, phase of treatment and depression. Unstandardized linear regression coefficient (b) for each variable and its p-value showed the effect of that variable on quality of life adjusting for the effect of other variables in the model. Positive regression coefficient (b) revealed a higher quality of life whereas negative coefficient (b) revealed a lower quality of life.

Figure 4.9 displayed regression coefficients for a variable comprising both depression and phase of treatment. These coefficients were plotted in the same manner as Figure 4.8 to be able to compare the interaction between depression and phase of treatment in univariate and multivariate analysis.

For physical health, psychological health and social relationship, pulmonary tuberculosis patients with depression who were in intensive phase of treatment had the poorest quality of life.

For physical health, among patients in intensive treatment phase, those with depression had 23 scores less quality of life than those without depression (b: 0 vs. 22.9, Figure 4.9). Similarly, for patients in continuation treatment phase, having depression was related to a drop of 11 scores quality of life (b: 10.6 vs. 21.8). Among patients without depression, receiving either intensive or continuation treatment phase had similar quality of life (b: 22.9 vs. 21.8). However, among patients with depression, being in intensive treatment phase caused poorer health (about 11 scores less) than in continuation phase (b: 0 vs. 10.6). Regarding age, pulmonary tuberculosis patients aged more than 60 years had poorer physical health (about 7 scores less) than those aged less than 41 years (b: -7.3 vs. 0). Family income was not related to physical health ($p=0.29$).

With regard to psychological health, pulmonary tuberculosis with depression patients in intensive treatment phase had about 13 scores less quality of life than those without depression (b: 0 vs. 12.7, Figure 4.9). Among patients in continuation treatment phase, having depression caused about 10 scores less quality of life less than those without depression (b: 8.7 vs. 19.1). Among pulmonary tuberculosis without depression patients in an intensive phase of treatment was related to a drop of quality of life about 6 scores compared to continuation phase (b: 12.7 vs. 19.1).

For pulmonary tuberculosis with depression patients in an intensive treatment phase caused a reduction in quality of life of 9 scores compared to continuation phase (b: 0 vs. 8.7). Age and family income were not related to psychological health.

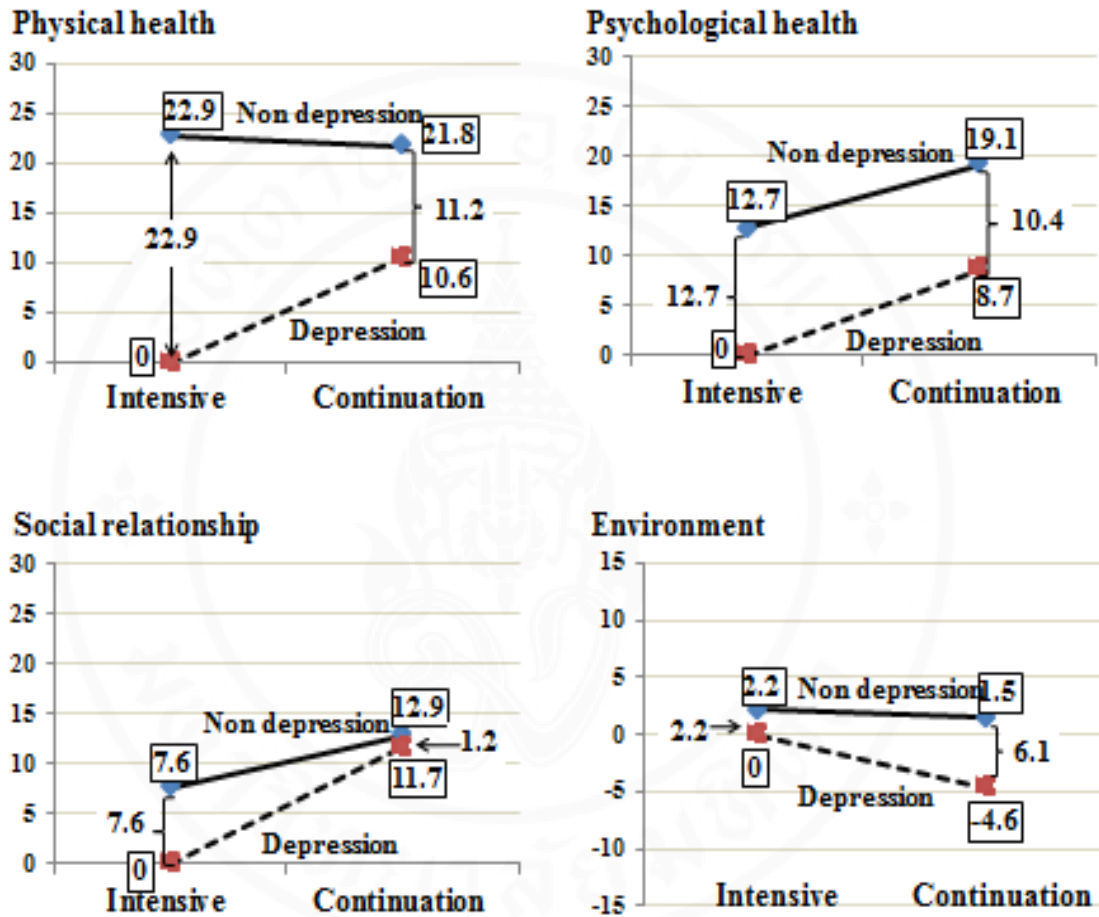
For social relationship, age and family income were not associated with quality of life. Pulmonary tuberculosis with depression patients in intensive treatment phase had the poorest quality of life (b=0) followed by those in intensive phase without depression (b=7.6). Patients without and with depression in continuation phase had more or less the same quality of life (b: 12.9 vs. 11.7).

With regard to environmental health, age, family income, phase of treatment and depression were not associated with less quality of life.

Table 4.15 Results of multiple linear regression analysis of each domain of quality of life

Variable	Domain of quality of life: Regression coefficient, b (p-value)			
	1	2	3	4
Age (years)				
≤40	-	-	-	-
41-60	-1.377 (p=0.69)	-0.931 (p=0.75)	-2.550 (p=0.47)	3.442 (p=0.31)
>60	-7.314 (p=0.05)	-3.561 (p=0.26)	-1.741 (p=0.64)	2.850 (p=0.42)
Family income (Baht)				
≤5000	-	-	-	-
>5000	2.949 (p=0.29)	3.700 (p=0.12)	4.337 (p=0.13)	2.794 (p=0.30)
Phase of treatment, depression				
Intensive, Depression	-	-	-	-
Intensive, No depression	22.911 (p<0.01)	12.703 (p=0.02)	7.572 (p=0.24)	2.188 (p=0.72)
Continuation, Depression	10.561 (p=0.11)	8.665 (p=0.12)	11.690 (p=0.08)	-4.562 (p=0.47)
Continuation, No depression	21.762 (p<0.01)	19.064 (p<0.01)	12.858 (p=0.04)	1.467 (p=0.80)

Figure 4.9 Regression coefficients for a variable comprising depression and phase of treatment



CHAPTER V

DISCUSSION

5.1 Summary

It was found that patient's age varied from 21 to 86 years with mean of 54.1. The majority of subject were male (67%), married (71.7%), education lower higher than primary school level (66.4%), agriculture (46%), family income of less than or equal 5,000 baht (59.3%). Majority of patients (65.5%) had severe pulmonary tuberculosis. Regarding category of tuberculosis, 93.8% were new cases (category I) and 71.7% were in intensive phase. The result show that 20.4% of patients had depression. Quality of life in physical health and environmental domain were poorer (mean of 67.8 and 71.1 respectively) than psychological health and social relationship (mean of 75.7 and 74.9 respectively).

The depression was negatively correlation with the quality of life by the correlation coefficient varied from -0.15 (for social relationship) to -0.54 (for physical health). Younger patients had better physical health than older patients (mean of 73.0, 70.1, 62.1 for age group 21-40, 41-60, >60 years respectively, $p=0.007$). Patients in intensive phase of treatment tuberculosis had significantly poorer psychological health than patients in continuation phase of treatment tuberculosis (mean of 71.8 vs. 77.3, $p = 0.041$). Patients with depression had much poorer physical and psychological health than those without depression (mean of 55.4 vs. 70.9, $p<0.001$ and 66.7 vs. 78.0, $p<0.001$ respectively). The interaction of phase of treatment and depression were associated with physical and psychological health ($p<0.001$).

The results of multiple linear regression analysis revealed the effect of depression on quality of life of pulmonary tuberculosis, that was poorer physical health, psychological health than those without depression in either intensive or continuation treatment phase ($p<0.01$).

5.2 Discussion

As mentioned above, 20.4% of the pulmonary tuberculosis patients was suffered from depression. This finding was quite similar to the research results worldwide indicating 21.6 - 68% (13, 38-42) of the high prevalence of depression among the pulmonary tuberculosis patients. It can be noted that the pulmonary tuberculosis patients are 5.3 times more risky to the depression than their family members without tuberculosis (OR = 5.303 95% CI = 11.358 - 2.476; $p = 0.001$); namely, 45.5% of the pulmonary tuberculosis patients with depression while 13.8% of the other healthy family members indicated depression (38).

The pulmonary tuberculosis patients with depression had poorer quality of life on physical health and psychological health domains when compared with those without depression ($p < 0.001$). Since the social relationship and environmental domains indicated the similar level ($p > 0.2$). The depression was negatively correlation with the quality of life, the correlation coefficients varied from -0.15, $p = 0.119$ (for social relationship) to -0.54, $p < 0.001$ (for physical health). The results of multiple linear regression analysis revealed the effect of depression on quality of life of pulmonary tuberculosis, that was poorer physical health, psychological health and social relationship than those without depression in either intensive or continuation treatment phase. According with other several previous research findings that depression was negatively associated with the quality of life of the pulmonary tuberculosis patients ($p < 0.05$) (21, 28). Similar to this study, there was a study concerning the impact of depression on quality of life in tuberculosis patients with HIV+ found that the correlation coefficient of the depression and the quality of life of the patients with HIV+ varied from -0.34, $p = 0.001$ (for the environment) to -0.59, $p = 0.001$ (for the psychological health). The tuberculosis patients with HIV+ and depression had 8.8 times poorer quality of life than those without depression (OR = 8.8, 95% CI: 3.2 – 23 (32). Such results were also consistent with the studies on the quality of life of the patients suffered from other chronic diseases such as asthma, cystic fibrosis, Chronic Obstructive Pulmonary Disease (COPD), and heart failure as depression was a factor that was associated with the poorer quality of life of the patients (33-37).

The younger patients had better quality of life than the older patients, the patients aged over 60 years old had significantly poorer physical health than those who were younger ($p=0.007$). This agrees with previous studies reporting that age was negatively associated with the quality of life of the tuberculosis patients (16, 21). In other words, the older patients tended to have poorer quality of life than the younger ones (17, 29). However, this finding is inconsistent. There was a study reporting age was not associated with the quality of life of the tuberculosis patients (24). The sample of the study had mean ages of 39.1 while this study has mean ages of 54.1. The finding of this study was not different quality of life of the patients aged less than or equal to 60 years old. That may be the reason for the conflicting results.

The association between the severity of tuberculosis and the quality of life of the patients was not found because the severity of tuberculosis was measured at first visit and among patients had been treated for a while before the quality of life was measured at the time of study. This agrees with previous study evaluated the quality of life of the tuberculosis patients who were in their treatment with the control group in China. It was found that the sputum smear results were not associated with the total SF-36 score ($p > 0.05$) (16). While other researches on the quality of life of the patients suffered from tuberculosis and chronic diseases indicated that the severity of disease affected the quality of life of the patients (17, 22, 26, 34, 37).

Phase of treatment had significantly associated with psychological health. The patients in intensively phase had better psychological health than those in continuation phase ($p = 0.041$). In addition, it seemed that the social relationship was different because the patients in the intensive phase had worse social relationship than those in the continuation phase ($p = 0.067$). However, no association between the phase of treatment and physical health and environmental ($p = 0.567$). These results were consistent with other several previous researches indicating that the tuberculosis treatment positively affected and improved the quality of life of the patients. However, most researches found that the physical health domain tended to be improved more than the psychological health. Anyhow, the quality of life of the tuberculosis patients, after the complete treatment, was still poorer than the general population (15-17, 20-23, 26-29).

Other factors in this research such as gender, marital status, education, occupation, and income were not associated with the quality of life of the pulmonary tuberculosis patients. This agrees with previous study reporting that gender was not associated to the quality of life of the tuberculosis patients (24) but contrary to other previous researches reporting that gender was associated with the quality of life of the tuberculosis patients (16, 29). It was found that the average scores of the quality of life of women were poorer than the ones of men (14, 15, 25) whereas the scores of the single or divorced patients were better than the married ones but without statistical significance in the both groups. The quality of life of the tuberculosis patients would be better when the patients were properly educated ($p < 0.05$), (24). The literacy and state of employment were also associated with the quality of life of the tuberculosis patients (29). While having a source of income was strongly associated with most of the quality of life domains (21, 32); that is, the quality of life of the tuberculosis patients would be better when their income was high ($p < 0.001$), (24).

To explore the effect of interaction between depression and tuberculosis on the quality of life. The phase of treatment and depression were considered together as one variable with four categories. Such variable was associated with physical health and psychological health domains ($p < 0.001$). The patients with depression who were in intensive treatment phase had the poorest physical health and psychological health followed by the patients with depression in continuation phase. The pulmonary tuberculosis patients without depression who were in either intensive or continuation treatment phase had better physical health and psychological health than those with depression. However, from the review, no study focused on the interaction between depression and phase of tuberculosis treatment on quality of life.

Hence, it can be concluded that depression worsened the quality of life of the tuberculosis patients who were treated in intensive and continuation phase.

5.2 Limitations

1) According to the review on previous researches (17, 22, 26, 34, 37), the severity of tuberculosis was associated with the quality of life of the patients. However, the severity of tuberculosis, by this research, was not associated with the quality of life due to the lack of measuring at the specific time. The severity was defined only by the analysis. Most of the samples of this research were the patients who had been treated for a while before the measurement of the quality of life. In addition, the general data of the samples were not collected to compare how tuberculosis could worsen the quality of life of the patients and how depression could affect the quality of life of the tuberculosis patients.

2) Based on the previous studies (15, 24), the average score of the tuberculosis patients in Category II is significantly lower than Category I. However, the category of tuberculosis was not associated with the quality of life in this research. The most of the samples of this research were the patients in Category I (106 samples) while only 7 samples in category II due to the sample of this research was not using purposive sampling.

CHAPTER VI

CONCLUSION AND RECOMMENDATION

6.1 Conclusion

A cross-sectional study aims to determine the association between the depression and the quality of life of pulmonary tuberculosis patients were carried out. The results confirmed the high prevalence rate of depression in pulmonary tuberculosis patients. Patients with depression had much poorer physical health and psychological health domain than those without depression ($p < 0.001$). The interaction of depression and phase of treatment were associated with physical health and psychological health domain ($p < 0.001$). The results of multiple linear regression analysis revealed the effect of depression on quality of life of pulmonary tuberculosis, especially for the physical and psychological health domains.

6.2 Recommendation

The main target of global tuberculosis control emphasizes only on treatment success rate. In fact, tuberculosis effects not only to physical health but also the psychological health, economy, and social conditions of the patients (13) Global Research indicates that the tuberculosis affect the quality of life of patients (14-18, 21, 23, 24, 26, 28, 29) In addition to the nature and the treatment factors of tuberculosis associated with the quality of life in the tuberculosis patients (15, 16, 18, 21-24) the results of the treatment improve the patient's quality of life (16, 17, 22, 26). However, this study found that if the tuberculosis patient has the depression, it will cause the pulmonary tuberculosis patient has worse quality of life on physical and psychological health domain than those without depression significantly in both intensive phase and continuation phase of treatment ($p < 0.01$). While the rate of depression in patients with

pulmonary tuberculosis during the treatment is quite high at 20.4 percent; therefore, the researcher desired to suggest the following recommendations :

6.2.1 The public health service systems should be provided for the tuberculosis patients to enhance the patient's quality of life. Furthermore, the effective drugs should be given to the patients whereas the depression should be screened among the tuberculosis patients during the treatment, due to it found the high prevalence of depression among the pulmonary tuberculosis patients. It was found especially in older patients which is a group with a poorest quality of life than other groups and higher risk of depression than those in other groups (50). Hence, tuberculosis should be used in the depression screening system by the Ministry of Public Health or clinic staffs at the hospital when the patients came to received the tuberculosis drugs at least once a month, whereas the public health staffs should monitor the patients at their home. The public health volunteers should also closely follow up the patients to observe the unusual symptoms or symptoms of depression so that will deliver the patient to the appropriate treatment.

6.2.2 Suggestions for Further Research

1) The study on the effect of depression on an adherence, the severity of tuberculosis and the treatment results for tuberculosis patients, including the disease distribution in the household contact etc. should be conducted.

2) There should be the study comparing an adherence, the treatment results or quality of life of the tuberculosis patients between the groups with and without the depression treatment during the tuberculosis treatment.

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แบบเก็บข้อมูลโครงการวิจัยเรื่อง
ความสัมพันธ์ระหว่างภาวะซึมเศร้ากับคุณภาพชีวิตของผู้ป่วยวัณโรคปอด

เลขที่แบบสัมภาษณ์.....วันที่สัมภาษณ์.....
รหัสโรงพยาบาล.....ผู้สัมภาษณ์.....

คำชี้แจงในการเก็บข้อมูล

แบบเก็บข้อมูลประกอบด้วย 2 ส่วน คือ

1. แบบบันทึกข้อมูลเกี่ยวกับลักษณะวัณโรคในผู้ป่วย โดยผู้สัมภาษณ์บันทึกข้อมูลตามแบบบันทึกการรักษาวัณโรค TB 01 หรือ TB 03
2. แบบสัมภาษณ์ ประกอบด้วย 3 ส่วน คือ
ส่วนที่ 1 ข้อมูลทั่วไปของผู้ป่วยวัณโรคปอด
ส่วนที่ 2 แบบประเมินโรคซึมเศร้า 9 คำถาม (9Q)
ส่วนที่ 3 แบบประเมินคุณภาพชีวิตขององค์การอนามัยโลกชุดย่อ ฉบับภาษาไทย
(WHOQOL – BREF)

กรุณาตอบตามความเป็นจริงที่ตรงกับท่านมากที่สุด ข้อมูลนี้จะนำไปใช้ในการวิเคราะห์เพื่อการศึกษาเท่านั้น จึงไม่มีผลกระทบต่อท่านแต่อย่างใด ข้อมูลทั้งหมดจะถูกเก็บเป็นความลับ และคาดหวังว่าผลการศึกษาที่ได้ จะเป็นข้อมูลเพื่อใช้ในการเสนอแนะสำหรับการปรับปรุงระบบการรักษาพยาบาลแก่ผู้ป่วยวัณโรคให้ดียิ่งขึ้น

1. แบบบันทึกข้อมูลเกี่ยวกับลักษณะวัณโรคปอดในผู้ป่วย

คำชี้แจง บันทึกข้อมูลตามแบบบันทึกการรักษาวัณโรค TB 01 หรือ TB 03

1. ประวัติการได้รับการรักษาวัณโรคมาก่อน

1. Category I : ผู้ป่วยรายใหม่ (New case) /ไม่เคยได้รับการรักษามาก่อน

2. Category II : เคยได้รับการรักษามาก่อน

ระบุประเภทผู้ป่วย.....

2.1 กลับเป็นซ้ำ (R)

2.2 รักษาซ้ำภายหลังล้มเหลว (TAF)

2.3 รักษาซ้ำภายหลังขาดยา (TAD)

2.4 อื่นๆ ระบุ

2. ความรุนแรงของวัณโรค

1. รุนแรง

1. ผลเสมหะครั้งล่าสุด เป็นบวก (M+)

2. ผล Chest X-ray พบแผลโพรงในปอด (Cavity)

3. HIV+ / AIDS

2. ไม่รุนแรง

1. ผลเสมหะครั้งล่าสุดเป็นลบ (M-)

2. ผล Chest X-ray ไม่พบแผลโพรง (Non – Cavity)/ไม่มีผล X-ray

3. HIV-

3. วันที่เริ่มรักษา.....(ระยะเวลาที่อยู่ในการรักษา.....วัน)

1. ระยะเข้มข้น (Intensive phase)

2. ระยะต่อเนื่อง (Continuation phase)

4. การมีโรคแทรกซ้อนหรือภาวะสุขภาพอื่นๆ ร่วมด้วย

1. ไม่มี

2. โรคมะเร็ง

3. โรคหัวใจและหลอดเลือด

4. โรคเบาหวาน

5. โรคหลอดเลือดในสมอง

6. โรคไต

7. โรคความดันโลหิตสูง

8. โรคตับ

9. หลังคลอดบุตรไม่เกิน 4 สัปดาห์

10. ภาวะตั้งครรภ์

11. อื่นๆ ระบุ

ส่วนที่ 2 แบบประเมินโรคซึมเศร้า 9 คำถาม (PHQ-9)

คำถาม ในช่อง 2 สัปดาห์ที่ผ่านมา ท่านมีอาการต่อไปนี้บ่อยแค่ไหน

(ทำเครื่องหมาย “✓” ในช่องที่ตรงกับคำตอบของท่าน)

อาการ	ไม่มีเลย	มีบางวัน ไม่บ่อย	มีค่อนข้าง บ่อย	มีเกือบ ทุกวัน
1. เบื่อทำอะไรๆ ก็ไม่เพลิดเพลิน				
2. ไม่สบายใจ ซึมเศร้า ท้อแท้				
3. หลับยาก หรือหลับๆ ตื่นๆ หรือหลับมากไป				
4. เหนื่อยง่าย หรือไม่ค่อยมีแรง				
5. เบื่ออาหาร หรือกินมากเกินไป				
6. รู้สึกไม่ดีกับตัวเอง คิดว่าตัวเองล้มเหลว หรือทำให้ตัวเองหรือครอบครัวผิดหวัง				
7. สมาธิไม่ดีเวลาทำอะไร เช่น ดูโทรทัศน์ ฟังวิทยุหรือทำงานที่ต้องใช้ความตั้งใจ				
8. พุดหรือทำอะไรซ้ำจนคนอื่นมองเห็น หรือกระสับกระส่ายจนท่านอยู่ไม่นิ่ง เหมือนเคย				
9. คิดทำร้ายตนเอง หรือคิดว่าถ้าตายๆ ไป เสียคงจะดี				

ถ้าท่านตอบว่ามีอาการไม่ว่าในข้อใดก็ตาม อาการนั้นๆ ทำให้ท่านมีปัญหาในการทำงาน การดูแล
สิ่งต่างๆ ในบ้าน หรือการเข้ากับผู้อื่น หรือไม่

ไม่มีปัญหาเลย	มีปัญหาบ้าง	มีปัญหามาก	มีปัญหามากที่สุด

ส่วนที่ 3 แบบประเมินคุณภาพชีวิตขององค์การอนามัยโลกชุดย่อ (WHOQOL – BREF)

คำถามต่อไปนี้จะถามว่าท่านรู้สึกอย่างไรกับคุณภาพชีวิต สุขภาพ หรือด้านอื่น ๆ ในชีวิตของท่าน โปรดเลือกคำตอบที่ท่านคิดว่าเหมาะสมที่สุด ถ้าท่านไม่แน่ใจเกี่ยวกับคำตอบในแต่ละคำถาม คำตอบแรกที่ท่านคิดจะเป็นคำตอบที่ดีที่สุด

โปรดทำเครื่องหมาย “✓” ในช่องที่ตรงกับความเห็นของท่าน ในช่วง 4 สัปดาห์ที่ผ่านมา เพียงหนึ่งช่องในแต่ละข้อ

	ไม่ใช้อย่างมาก	ไม่ดี	ปานกลาง	ดี	ดีมาก
1. ท่านให้คะแนนคุณภาพชีวิตของท่านอย่างไร					

	ไม่พอใจมาก	ไม่พอใจ	เฉย ๆ	พอใจ	พอใจมาก
2. ท่านพอใจเกี่ยวกับสุขภาพของท่านอย่างไร					

คำถามต่อไปนี้จะถามเกี่ยวกับประสบการณ์ของท่าน ในบางสิ่งบางอย่างว่ามีอย่างน้อยแค่ไหน
ในช่วง 4 สัปดาห์ ที่ผ่านมา

	ไม่เคย	เล็กน้อย	ปานกลาง	มาก	มากที่สุด
3. ท่านมีความรู้สึกเจ็บปวดทางร่างกาย จนไม่สามารถที่จะทำในสิ่งที่ท่านอยากทำมากนักเลยเพียงใด					
4. ท่านต้องการ การรักษาทางการแพทย์ มากน้อยแค่ไหน เพื่อให้สามารถปฏิบัติภารกิจประจำวันได้					
5. ท่านมีความสุขในการดำเนินชีวิตมากน้อยแค่ไหน					
6. ท่านรู้สึกว่า ชีวิตของท่านมีความหมาย มากน้อยแค่ไหน					
7. ท่านสามารถที่จะมีสมาธิได้ดีเพียงใด					
8. ท่านรู้สึกว่า ชีวิตประจำวันของท่านปลอดภัยมากน้อยแค่ไหน					
9. ท่านคิดว่าสิ่งแวดล้อมของท่านมีสุขอนามัย อย่างไร					

คำถามต่อไปนี้จะถามเกี่ยวกับสิ่งที่คุณได้รับประสบ หรือ สามารถจะทำบางสิ่งบางอย่างได้
สมบูรณ์ครบถ้วนอย่างไร ในช่วง 4 สัปดาห์ที่ผ่านมา

	ไม่เลย	เล็กน้อย	ปานกลาง	ส่วนใหญ่	ได้สมบูรณ์
10. คุณมีพลังงาน (กำลังวังชา) เพียงพอในการดำเนินชีวิตประจำวันหรือไม่					
11. คุณสามารถที่จะยอมรับรูปร่างหน้าตาของตัวเองหรือไม่					
12. คุณมีเงินเพียงพอที่จะสนองความต้องการของคุณได้หรือไม่					
13. คุณได้รับข้อมูลข่าวสารที่คุณต้องการ ในการดำเนินชีวิตประจำวันหรือไม่					
14. คุณมีโอกาสที่จะทำกิจกรรมยามว่าง มากน้อยแค่ไหน					

	ไม่ดีอย่าง มาก	ไม่ดี	ปานกลาง	ดี	ดีมาก
15. คุณสามารถที่จะไปไหนมาไหนได้ดีเพียงใด					

คำถามต่อไปนี้จะถามเกี่ยวกับสิ่งที่ท่านได้รับประสบ หรือ สามารถจะทำบางสิ่งบางอย่างได้
สมบูรณ์ครบถ้วนอย่างไร ในช่วง 4 สัปดาห์ที่ผ่านมา

	ไม่พอใจ มาก	ไม่พอใจ	เฉย ๆ	พอใจ	พอใจมาก
16. ท่านพอใจกับการนอนหลับของท่าน อย่างไร					
17. ท่านพอใจกับความสามารถของท่าน ในการดำเนินกิจกรรมในชีวิตประจำวัน เพียงใด					
18. ท่านพอใจกับความสามารถในการ ทำงานของท่านเพียงใด					
19. ท่านพอใจกับตัวของท่านเองอย่างไร					
20. ท่านพอใจกับความสัมพันธ์ส่วนตัว ของท่าน (ความสัมพันธ์กับบุคคลรอบ ข้าง) อย่างไร					
21. ท่านพอใจกับชีวิตทางเพศของท่าน อย่างไร					
22. ท่านพอใจเกี่ยวกับการสนับสนุน หรือช่วยเหลือที่ได้รับจากเพื่อนๆ อย่างไร					

	ไม่พอใจ มาก	ไม่พอใจ	เฉย ๆ	พอใจ	พอใจมาก
23. ท่านพอใจเกี่ยวกับสภาพที่อยู่อาศัย ของท่านอย่างไร					
24. ท่านพอใจเกี่ยวกับการที่คุณสามารถ เข้าถึงการบริการทางด้านสุขภาพ อย่างไร					
25. ท่านพอใจเกี่ยวกับการเดินทางของ ท่าน มากน้อยอย่างไร					

คำถามต่อไปนี้จะกล่าวถึงความรู้สึก หรือประสบการณ์ที่คุณได้รับ เกี่ยวกับบางสิ่งบางอย่าง ที่เกิดขึ้น บ่อย ๆ ในช่วง 4 สัปดาห์ ที่ผ่านมา

	ไม่เคยเลย	น้อยครั้ง	ค่อนข้างบ่อย	บ่อยมาก	ตลอดเวลา
26. ท่านมีความรู้สึกในด้านลบ เช่น ความรู้สึกเศร้า ผิดหวัง วิตกกังวล หดหู่ใจ บ่อยครั้งแค่ไหน					

คุณมีข้อคิดเห็นเกี่ยวกับการประเมินหรือไม่ ?

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