An Analysis of Factors Influencing the Compliance to Treatment of Pulmonary Tuberculosis Patients Through Family Resilience

Dhian Satya Rachmawati[1], Nursalam Nursalam[2], Muhammad Amin[3], Rachmat Hargono[4], Mahmudah[5], A.V. Sri Suhardiningsih[6], Nuke Amalia[7]

[1]Faculty of Public health, Airlangga University, 60115, Indonesia

[2]Faculty of Nursing, Airlangga university, 60115, Indonesia

[3]Faculty of Medicine, Airlangga University, 60115, Indonesia

[4,5]Faculty of Public health, Airlangga University, 60115, Indonesia

[6,7]Sekolah Tinggi Ilmu Kesehatan Hang Tuah Surabaya, 60244, Indonesia

Abstract

Background: Family holds an important role in the care of patient's health against a disease or illness. The majority of pulmonary TB (tuberculosis) patients have poor social support systems and compliance. Problems with pulmonary TB patients have an impact on families and family unpreparedness, lack of family knowledge about tuberculosis, and the impact of discrimination (stigma) are some of the factors that need to be considered. The family resilience model to improve the compliance of pulmonary TB patients in carrying out treatment programs still requires further study. Research Objectives: To develop a model of family resilience as an effort to improve compliance to treatment for pulmonary TB patients. Research Methods: This study adopted a cross-sectional design. It was conducted in the work areas of Puskesmas in Surabaya City from August to December 2019. A sample of families with pulmonary TB patients containing 160 respondents was calculated using the Rule of Thumb formula, using a multistage random sampling technique. Research variables included: 1) individual factors: age, gender, education, knowledge, position of the patient in the family, personal motivation, 2) family factors: family type, family structure, family health care function, 3) social factors: social support, stigmas, 4) family stressors, including loss, illness and care, tension, 5) individual stress, including depression, anxiety, stress, 6) family stress, 7) family problem solving and coping skills, 8) family resilience, including survival, adaptation, acceptance, growing stronger, helping others, 9) individual belief, including susceptibility, severity, barriers, benefits, cues to action and self-efficacy, and 10) medication compliance included medication compliance and BTA conversion results. Data were collected using a questionnaire which was developed and analyzed using SEM-PLS. Research Results: The family resilience model as an effort to improve treatment compliance for pulmonary TB patients was a fit model with good predictive relevance (SRMR=0.053<0.081; NFI=0.919>0.90; Q2>0). Individual factors (t-stat=3.048) and family stress (t-stat=4.923) have an effect on the pulmonary TB patients. Individual stress (t-stat=2.642) and family resilience (t-stat=5.163) have an effect on individual beliefs. Patient factors (t-stat=2.429), family factors (t-stat=2.999), social factors (t-stat=2.745), and family stressors (t-stat=3.345) have an effect on family stress. Family stress affects family problem solving and coping skills (t-stat t=3.606). Problem solving ability and family coping skills affect family resilience (t-stat=2.116). Family resilience affects medication compliance (t-stat=7.407), while the patient's belief affects compliance (t-stat=2.881). Conclusions: There is better increased compliance to treatment through family resilience compared to individual beliefs of pulmonary TB patients. Family plays an important role in the care of sick family members, and one of the family functions is health care. Family as a group can cause, prevent, ignore, or remedy health problems in the group.

Keywords: Family Resilience, Individual Beliefs, Medication Compliance, Pulmonary Tuberculosis.

Access this article online	
Quick Response Code:	Website: www.pnrjournal.com
	DOI: 10.47750/pnr.2022.13.04.170

1. Introduction

Family resilience refers to the capacity of the family system to survive and recover from adversity, reinforce and be more resourceful (Walsh, 2007). More than simply overcoming or enduring trials, resilience involves positive adaptation, (re)gaining the ability to thrive, with personal and relational transformation and positive growth forged through experience.

Address for correspondence: Dhian Satya Rachmawati
Faculty of Public health, Airlangga University, 60115, Indonesia
Email: dhian.satya.rachmawati-2017@fkm.unair.ac.id

How to cite this article: D S Rachmawati, N Nursalam, M Amin, R Hargono, Mahmudah, A.V. Sri Suhardiningsih, Nuke Amalia, An Analysis of Factors Influencing the Compliance to Treatment of Pulmonary Tuberculosis Patients Through Family Resilience, J PHARM NEGATIVE RESULTS 2022;13: 1210-1223.

In the biopsychosocial system orientation, risk and resilience are viewed from a variety of recursive effects, involving interactions of the individual, family, community, and larger system levels over time (Falicov, 2012). Family disorders can result from failed attempts to deal with overwhelming crises in the family or cumulative stresses with the broader impact of collective trauma (Walsh, 2007, 2016b).

The role of families of TB patients in TB control efforts is still far what is considered ideal. In TB control efforts, family involvement is important for TB case identification and as a Drug Swallowing Supervisor (PMO), while family involvement in health promotion efforts, prevention of transmission and treatment is faint in TB control activities. Family plays an important role in the care of sick family members, and one of the family functions is health care (Friedman, 2014). Family as a group can cause, prevent, ignore, or remedy health problems in the group. Health problems in the family are interrelated and if one member is sick, it will affect other family members and will also affect the surrounding community (Friedman, 2014).

Previous studies have demonstrated that in a chronic condition, Family caregivers often feel unprepared to provide care, have insufficient knowledge to provide appropriate care and receive little guidance from formal health care providers. In TB cases, there is a prevailing misunderstanding in the family and society that leads to disease discrimination (Kaulagekar-nagarkar, Dhake, & Jha, 2012). Discrimination perceived at the beginning of diagnosis is one of the causes of depression (Li-Yun Lee, Heng-Hsin Tung, Shu-Ching Chen, 2017). Families with family members who suffer from pulmonary tuberculosis are often faced with stress-inducing conditions, including psychosocial problems such as loss of hope, sleep disturbances or rest disorders (Prakash Chandra, Sangita Singh, 2011). Depression incidence can also happen to TB patients (Shen et al., 2014).

Characteristics of pulmonary TB patients as measured by age, gender, education level, knowledge, personal motivation and the patient's position in the family are individual factors which are indicators of patient factors which are arranged based on several models, namely the Family Centered Nursing model. According to Friedman (2014), in the nursing care model that he developed, the individual factor is one of the factors that influence the family in the perspective of the family as a unit because the family is a collection of interacting and dependent individuals. Individual factors of pulmonary TB patients are also arranged according to the Health Belief Model where individual factors or the so-called modifying model consist of age, gender, knowledge, interpersonal, and socioeconomic. This patient factor or personal factor in the compliance model also has a direct effect on medication compliance, as stated by Nelson (2018).

The IMB model consists of 3 (three) indicators, namely information, personal motivation and social motivation. In the conceptual framework of this study, family factors and social factors are predicted as ones of the factors that influence medication compliance behavior. This study analyzed and demonstrated that family factors affect the family as a unit and system in decision-making and coping, so that family independence in carrying out health care functions for family members who suffer from pulmonary TB is formed, the family become resilient, which helps pulmonary TB patients to practice compliance to treatment. Family resilience will have an effect on individual beliefs so that individuals will have perceptions and beliefs to comply with pulmonary TB treatment and the researchers had a hypothesis that family resilience has a greater effect on pulmonary TB treatment compliance than individual factors. Also analyzed in this study are models of compliance behavior arising from individual, family and social sources.

Compliance behavior of pulmonary TB patients is influenced by individual personal factors which will then become stressors which will lead to stress on individuals which will then affect individual beliefs and then affect their compliance with treatment. Meanwhile, individuals who live in families according to this study will show better compliance behavior. Personal factors, TB characteristics, family factors, social factors and stressors in the family are predicted to affect family stress where with this stress the family will make coping efforts that will affect family resilience starting from the stages of receiving support, adapting, accepting, growing stronger and providing support to others so that the family will be a better supporter for the formation of compliant behavior towards treatment in family members who suffer from pulmonary TB.

2. Material and Methods

Design

This study adopted quantitative analysis with a cross-sectional design, conducted in the work areas of Puskesmas

in Surabaya City from August to December 2019. Research variables included: 1) individual factors: age, gender, education, knowledge, position of the patient in the family, personal motivation, 2) family factors: family type, family structure, family health care function, 3) social factors: social support, stigmas, 4) family stressors, including loss, illness and care, tension, 5) individual stress, including depression, anxiety, stress, 6) family stress, 7) family problem solving and coping skills, 8) family resilience, including survival, adaptation, acceptance, growing stronger, helping others, 9) individual belief, including susceptibility, severity, barriers, benefits, cues to action and self-efficacy, and 10) medication compliance included medication compliance and BTA conversion results.

Population and Sample

The population was families of pulmonary TB patients who were diagnosed with pulmonary TB for the first time. A sample of 160 respondents was calculated using the Rule of Thumb formula, using the multistage random sampling technique.

Data Collection

Data were collected through a questionnaire which had been tested for validity and reliability. The study carried out has gone through an ethical test at the Health Research Ethics Commission of the Faculty of Nursing, Universitas Airlangga with certificate number 1750-KEPK.

Data Analysis

The data were analyzed using SEM-PLS to find the value of the goodness of fit indicator.

3. Results and Discussion

Respondent Demographic Data

The characteristics of research respondents, namely families of pulmonary TB patients are described in the following table:

Table 1. Characteristics of Pulmonary TB Patient Families in Surabaya, August to December 2019 (n=160)

No	Variable	Frequency (f)	Percentage (%)
1	Respondent Age		
	a. 17 – 24	14	8.8
	b. 25 – 34	36	22.5
	c. 35 – 44	34	21.3
	d. 45 – 55	44	27.4
	e. 55 – 64	24	15.0
	f. > 64	8	5.0
2	Gender		
	a. Men	43	26.9
	b. Women	117	73.1
3	Education		
	a. No School	6	3.8
	b. Elementary/Junior High School (*SD* & *SMP*)	60	37.5
	c. High School (*SMA*)	77	48.1
	d. Higher Education	17	10.6
4	Respondent position in the family		
	a. Husband	30	18.8
	b. Wife	57	35.6
	c. Child	37	23.1
	d. Others	36	22.5
5	Respondent		
	a. Housewife	57	35.6
	b. Self-employed	39	24.4
	c. PNS/TNI/POLRI	3	1.8
	d. Factory worker	9	5.6
	e. Unemployed	18	11.3
	f. Entrepreneur/others	34	21.3
6	DS for pulmonary TB patients		
	a. Husband	23	14.3
	b. Wife	59	36.9
	c. Child	36	22.5
	d. Other siblings	42	26.3

Based on Table 1, most of the respondents' ages were in the range of 45 - 54 years, namely 44 respondents (27.5%), most of the respondents were women, namely 117 respondents (73.1%), half of the respondents were graduates of secondary education (SMA), namely 77 respondents (48.1%), and most of the respondents in the family were the wife, namely 57 respondents (35.6%). Most of the respondents were housewives, namely 57 respondents (35.6%). The majority of family members who acted as Drug Supervisor (DS) were wives, namely 59 respondents (36.9%).

Variable Description

Individual Factors of Pulmonary TB Patients (X1)

Table 2. Frequency Distribution of Individual Factors of Pulmonary TB Patients in Surabaya, 2019 (n=160)

No	Variable	Indicators	Frequency (f)	Percentage (%)
1	Age (X1.1)	a. 17 – 24	23	14.3
		b. 25 – 34	16	10.0
		c. 35 – 44	34	21.3
		d. 45 – 55	33	20.6
		e. 55 – 64	34	21.3
		f. > 64	20	12.5
2	Sex (X1.2)	a. Men	87	54.4
		b. Women	73	45.6
3	Education (X1.3)	a. No School	14	8.8
		b. Elementary/Junior High School (*SD* & *SMP*)	69	43.1
		c. High School (*SMA*)	63	39.3
		d. Higher Education	14	8.8
2	Knowledge (X1.4)	a. Good	94	58.8
		b. Adequate	54	33.8
		c. Poor	12	7.4
5	TB Patients' Position in the Family (X1.5)	a. Husband	65	40.6
		b. Wife	40	25.0
		c. Child	30	18.8
		d. Others	25	15.6
6	Personal Motivation of TB Patients (X1.6)	a. Good	63	39.4
		b. Enough	76	47.5
		c. Poor	21	13.1

Table 2 shows pulmonary TB patient factors. Most patients with pulmonary TB were aged 35-44; 55-64 years old are still in the productive age category (34 respondents [21.3%]), knowledge of more than half of patients about pulmonary TB was in the good category (94 people [58.8%]), educational background of less than half of TB patients had elementary education (SD or SMP) (69 respondents [43.1%]), more than half of the pulmonary TB patients were male (87 respondents [54.4%]), the position of the pulmonary TB patients in the family was mostly husbands (65 respondents [40.6%]), and the motivation of the pulmonary TB patients was mostly were in the sufficient category (76 respondents [47.5%]) and 21 people (13.1%) had poor motivation.

Family Factors (X2)

Table 3. Frequency Distribution of Family Factors of Pulmonary TB Patients in Surabaya, 2019 (n=160)

No	Variable	Indicator	Frequency (f)	Percentage (%)
1	Family Type (X2.1)	a. Husband and wife and children.	107	66.8
		b. Families without children		
		c. Families not living in one house because the husbands/wives are out of town	4	2.5
		d. Families not living in one house,	6	33.8

No	Variable	Indicator	Frequency (f)	Percentage (%)
		consisting of parents and their descendants who already have families		
		e. Families with living parents	32	20.0
		f. Families living in one house, consisting of 2 or more small families	4	2.5
		g. Families consisting of mother, child, no marriage and adopted child	5	3.1
			2	1.3
2	Family Power Structure (X2.2)	a. Head of Family	86	53.8
		b. Wife	15	9.4
		c. Husband and Wife	9	5.6
		d. Big Family	50	31.2
3	Family Health Care Function (X2.3)			
	a. Identifying Problems	1) Good	151	94.3
		2) Adequate	7	4.4
		3) Poor	2	1.3
	b. Making Decisions			
		1) Good	146	91.2
		2) Adequate	11	6.9
	c. Taking care of sick family members	3) Poor	3	1.9
		1) Good	114	71.3
	d. Modifying Environment	2) Adequate	33	20.6
		3) Poor	13	8.1
	e. Utilizing Health Service Facilities	1) Good	122	76.2
		2) Adequate	26	16.3
		3) Poor	12	7.5
		1) Good	136	85.0
		2) Adequate	21	13.1
		3) Poor	3	1.9

Table 3 shows family types of pulmonary TB patients. Most of them were nuclear families, namely families consisting of husband and wife and children (107 families [66.8%]). In the family power structure shown by the decision makers, most families adhere to a patriarchal structure where the decision maker in the family is given to the husband as the head of the family (86 families [53.8%]). The function of the family, especially related to health care, consisted of the ability of the family to identify problems, make decisions, care for sick family members, modify the environment and utilize health service facilities. The majority of families were able to identify problems well (151 families [93.4%]); similarly, in terms of decision making, the majority of families were able to decide well (146 families [91.3%]). In

terms of the ability of families to care for family members who suffer from pulmonary TB, most of them were in the good category (114 families [71.3%]), while the ability of families in modifying an appropriate and proper environment for patients with pulmonary TB and preventing disease transmission was fairly high (122 families [76.3%]), and for the ability of families to utilize health service facilities for control, taking medication and counseling about illness, most of the families were in the good category (136 families [85.0%]).

Social Factors (X3)

Table 4. Frequency Distribution of Social Factors of Pulmonary TB Patients in Surabaya, 2019 (n=160)

No	Variable	Indicator	Frequency (f)	Percentage (%)
1	Social Support (X3.1)	Good	97	60.6
		Adequate	51	31.9
		Poor	12	7.5
2	TB Stigma	High	29	18.1
		Moderate	86	53.8
		Low	45	28.1

Table 4 shows that the social support of most families was in the good category (97 families [60.6%]). For the stigma of pulmonary TB disease in the family and community, most families said the stigma was in the moderate category (86 families [53.8%]) and 29 (18.1%) families felt the stigma in the high category.

Family Stressors (X4)

Table 5. Frequency Distribution of Social Factors of Pulmonary TB Patients in Surabaya, 2019 (n=160)

No	Variable	Indicators	Frequency (f)	Percentage (%)
1	Loss Stressor (X4.1)	a. No stressor	126	78.8
		b. Mild Stressor	21	13.1
		c. Moderate Stressor	5	3.1
		d. Severe Stressor	5	3.1
		e. Very Severe Stressor	3	1.9
2	Health Stressor (illness and treatment) (X4.2)	a. No Stressor	33	20.6
		b. Mild Stressor	82	51.3
		c. Moderate Stressor	20	12.4
		d. Severe Stressor	14	8.8
		e. Very Severe Stressor	11	6.9
3	Tension Stressor (X4.3)	a. No Stressor	52	32.4
		b. Mild Stressor	70	43.8
		c. Moderate Stressor	19	11.9
		d. Severe Stressor	11	6.9
		e. Very Severe Stressor	8	5.0

Table 5 shows family perceived stressors of loss, most families did not have stressors (126 families [78.8%]). For health stressors which included illness and its treatment, most families were in the mild stressor category (82 families [51.3%]) and 45 families (28.1%) perceive illness and treatment stressors were in the moderate to very severe category, while for tension stressors, the most were in the mild stressor category, namely 70 (43.8%) and there were 38 (23.8%) families who felt tension stressors in the moderate to very severe category.

Individual Stressors (X5)

Table 6 Frequency Distribution of Individual Factors of Pulmonary TB Patients in Surabaya, 2019 (n=160)

No	Variable	Indicators	Frequency (f)	Percentage (%)
1	Depression (X5.1)	a. Normal	107	66.9
		b. Mild depression	33	20.6
		c. Moderate depression	19	11.9
		d. Severe depression	1	0.6
		e. Very severe depression	0	0.0
2	Anxiety (X5.2)	a. Normal	90	56.3
		b. Mild anxiety	13	8.1

		c.	Moderate anxiety	41	25.6
		d.	Severe anxiety	12	7.5
		e.	Very severe anxiety	4	2.5
3	Stress (X5.3)	a.	Normal	134	83.8
		b.	Mild Stress	18	11.2
		c.	Moderate Stress	5	3.1
		d.	Severe Stress	3	1.9
		e.	Very Severe Stress	0	0.0

Table 6 shows that of the 160 respondents with pulmonary TB, most were not depressed or normal (107 people [66.9%]) and more than half did not experience anxiety (90 people [56.3%]) and the majority were not stressed or normal (134 people [83.8%]). However, 59 (33.1%) and 76 (43.7%) pulmonary TB patients experienced mild to very severe anxiety, and 26 (16.2%) sufferers feel stress in the mild to very severe category.

Family Stress (X6)

Table 7 Frequency Distribution of Individual Factors of Pulmonary TB Patient Families in Surabaya, 2019 (n=160)

No	Variable	Indicator	Frequency (f)	Percentage (%)
1	Family Stress (X6)	Normal	45	28.1
		Mild Stress	76	47.5
		Moderate Stress	36	22.5
		Severe Stress	3	1.9

Table 7 shows that many families experienced mild stress (76 families [47.5%]) and the rest did not experience stress (normal), moderate stress, and severe stress.

Family Problem Solving and Coping Skill (X7)

Table 8. Frequency Distribution of Family Coping of Pulmonary TB Patient Families in Surabaya, 2019 (n=160)

No	Variable	Indicator	Frequency (f)	Percentage (%)
1	Family Coping (X7)	Good	8	5.0
		Fair	145	90.6
		Poor	7	4.4

Table 8 shows that of the 160 respondents, the majority had fairly good coping (145 respondents [90.6%]), while the remaining 8 respondents (5.0%), had good coping and 7 respondents (4.4%) had poor coping.

Family Resilience (Y1)

Table 9. Frequency Distribution of Family Resilience of Pulmonary TB Patient Families in Surabaya, 2019 (n=160)

No	Variable	Indicator	Frequency (f)	Percentage (%)
1	Survival Phase Resilience (Y1.1)	Not *Survive*	69	43,1
		Survive	91	56,9
2	Adaptation Phase Resilience (Y1.2)	Not Adapted	84	52,5
		Adapted	76	47,5
3	Acceptance Phase Resilience (Y1.3)	No Acceptance	90	56,2
		Acceptance	70	43,8
4	Growing Stronger Phase Resilience (Y1.4)	Not Growing Stronger	95	59,4
		Growing Stronger	65	40,6
5	Helping Other Phase Resilience (Y1.5)	Not Helping Other	101	63,1
		Helping Other	59	36,9

Table 9 shows that of the 160 family respondents, 91 (56.9%) were able to survive, 84 (52.5%) had not been able to adapt, 90 (56.3%) had not accepted, 95 (59.4%) had not grown stronger, and 101 families (63.1%) had not been able to help others.

Individual Belief (Y2)

Table 10. Frequency Distribution of Individual Beliefs of Pulmonary TB Patient Families in Surabaya, 2019 (n=160)

No	Variable	Indicator	Frequency (f)	Percentage (%)
1	Perceived Susceptibility (Y2.1)	a. Good	35	21.9
		b. Adequate	124	77.5
		c. Poor	1	0.6
2	Perceived Severity (Y2.2)	a. Good	8	5.0
		b. Adequate	143	89.4
		c. Poor	9	5.6
3	Perceived Barrier (Y2.3)	a. Good	15	9.4
		b. Adequate	105	65.6
		c. Poor	40	25.0
4	Perceived Benefit (Y2.4)	a. Good	94	58.7
		b. Adequate	64	40.0
		c. Poor	2	1.3
5	Cues to Action (Y2.5)	a. Good	112	70.0
		b. Adequate	46	28.7
		c. Poor	2	1.3
6	Self-Efficacy (Y2.6)	a. Good	110	68.8
		b. Adequate	50	31.2
		c. Poor	0	0.0

Table 10 shows that out of 160 respondents, most of the respondents had adequate perceived susceptibility related to pulmonary TB disease (124 people [77.5%]). The majority of respondents have an adequate perceived severity of pulmonary TB disease (143 people [89.4%]). Most of the respondents have a sufficient perceived barrier (105 people [65.6%]). More than half of the respondents were in the good category for perceived benefits (94 people [58.8%]). Most of the respondents have the ability to cues to action in the good category (112 respondents [70.0%]). Most of the respondents' self-efficacy was in the good category (110 respondents [68.8%]).

Compliance with Medication of Pulmonary TB Patients (Y3)

Table 11. Frequency Distribution of Medication Compliance of Pulmonary TB Patients in Surabaya, 2019 (n=160)

No	Variable	Indicator	Frequency (f)	Percentage (%)
1	Medication Compliance (Y3.1)	a. Compliant	139	86.9
		b. Potentially Non-Compliant	5	3.1
		c. Non-Compliant	16	10.0
2	AFB Conversion (Y3.2)	a. Conversion	144	90.0
		b. No Conversion	16	10.0

Table 11 shows the compliance of pulmonary TB patients to take medication. Most of them were in the compliance category (139 people [86.9%]) and 21 respondents (13.1%) had a risk of non-compliance and treatment non-compliance behavior. Most of the respondents experienced conversion at the AFB and RO examination at the end of the second month (144 people [90.0%]) and 16 (10%) respondents did not experience AFB conversion.

Values of Loading Indicator in Variable

Table 12. Loading Indicator Values in Latent Variables

No	Factor Variable	Indicator Variable	Initial Outer Model	
			Factor Loading	p-value
1	X1.Patient Factors	X11_age	0.074	0.791
		X12_knowledge	0.318	0.351
		X13_education	0.027	0.917
		X14_gender	0.751	0.008
		X15_position	0.767	0.003

No	Factor Variable	Indicator Variable	Initial Outer Model	
		X16_motive	0.610	0.006
2	X2.Family Factors	X21_FamilyType	0.610	0.026
		X22_familyStructure	0.778	0.045
		X23_healthCaregiver	0.940	0.021
3	X3.Social Factors	X31_SocialSupport	0.629	0.012
		X32_TBstigma	0.868	0.001
4	X4.Family Stressors	X41_lossStressor	0.552	0.034
		X42_healthStressor	0.672	0.003
		X43_tensionStressor	0.865	0.001
5	X5.Individual Stress	X51_depression	0.918	0.001
		X52_anxiety	0898	0.001
		X53_stress	0773	0.001
6	X6.Family Stress	X61_familyStress	1.000	
7	X7.Family Coping	X71_FamilyCoping	1.000	
8	Y1.Family Resilience	Y11_survive	0.852	0.001
		Y12_adapt	0.940	0.001
		Y13_accept	0.969	0.001
		Y14_grow	0.958	0.001
		Y15_helping	0.915	0.001
9	Y2.Individual Beliefs	Y21_perceiveSuscep	0.898	0.001
		Y22_perceiveSever	0.903	0.001

In Table 12, there are indicators with a loading value of <0.5, so, the next step is to eliminate three indicators on the patient factor variable, namely age, education and knowledge indicators, as shown in the picture below:

Figure 1 An outer model construct of Patient Factor Variable in the Family Resilience Model as an Effort to Improve the Medication Compliance of Pulmonary TB Patients in Surabaya, August to December 2019 (n=160)

Figure 1 shows that the loading values of the other indicator factors on the latent variable of patient factors, after 3 indicators that were <0.5 were eliminated, are more than 0.5. After all the indicators on the latent variables are fit, the test results are shown in the following table:

Table 13. Results of Convergent Factor Loadings

Variable	**Indicator**	**Second Outer Model**	
		Factor Loading	**p-value**
Individual Factors (X1)	X1.4 Gender	0.793	0.001
	X1.5 TB patient's position in family	0.824	0.001
	X1.6 Personal motivation	0.631	0.001
Family Factors (X2)	X2.1 Family Type	0.610	0.026
	X2.2 Family Structure	0.778	0.045
	X2.3 Family Health Care Function	0.940	0.021
Social Factors (X3)	X3.1 Social Support	0.629	0.012
	X3.2 Pulmonary TB Stigma	0.868	0.001
Family Stressors (X4)	X4.1 Loss Stressor	0.552	0.034
	X4.2 Health Stressor	0.672	0.003
	X4.3 Tension Stressor	0.865	0.001
Individual Stress of Pulmonary TB Patients (X5)	X5.1 Depression	0.915	0.001

Variable	Indicator	Second Outer Model	
		Factor Loading	p-value
	X5.2 Anxiety	0.901	0.001
	X5.3 Stress	0.772	0.001
Family Stress (X6)	Family Stress (X6)	1.000	
Family Problem Solving and Coping Skill *(X7)*	Family Problem Solving and Coping Skill *(X7)*	1.000	
Family Resilience (Y1)	Y1.1 Survive	0.852	0.001
	Y1.2 Adaptation	0.940	0.001
	Y1.3 Acceptance	0.969	0.001
	Y1.4 Growing Stronger	0.958	0.001
	Y1.5 Helping Others	0.915	0.001
Individual Beliefs (Y2)	Y2.1 Perceived Susceptibility	0.898	0.001
	Y2.2 Perceived Severity	0.903	0.001
	Y2.3 Perceived Barrier	0.811	0.001
	Y2.4 Perceived Benefit	0.925	0.001
	Y2.5 Cues to Action	0.921	0.001
	Y2.6 Self-Efficacy	0.882	0.001
Compliance with Pulmonary TB Medication (Y3)	Y3.1 Medication Compliance	0.811	0.001
	Y3.2 AFB Conversion	0.872	0.001

Based on Table 13, it can be seen that all indicators produced a loading factor value of more than 0.5. Furthermore, all variables produced p-value <0.05. Thus, based on convergent validity, all of these indicators were declared valid. The indicator of the position of pulmonary TB patients in the family gave the highest contribution to the individual factors of pulmonary TB patients. Family health care function indicators contributed the most to family factors. The stigma indicator of pulmonary TB perceived by the family contributed the most to social factors, and to family stressor factors, the tension stressor indicator contributed the most. Indicators of depression provided the highest contribution to individual stress. In the family resilience factor, the acceptance indicator gave the highest contribution, while the perceived benefit indicator contributed the most to the individual belief factor of pulmonary TB patients. AFB conversion provided the most contribution for the compliance factor. It is evidenced by the highest factor loading value.

Structural Model Testing Analysis

Evaluation of the structural model or inner model is a step to predict the causal relationship between latent variables or variables that cannot be measured directly, as well as evaluate the goodness of fit which includes the coefficient of determination and predictive relevance. A significant model construct can be seen in the following figure:

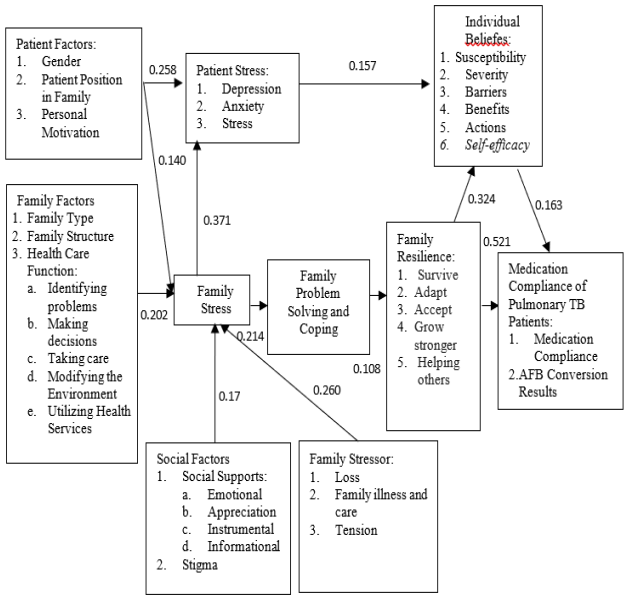

Figure 2. Family Resilience Model as an Effort to Improve the Medication Compliance of Pulmonary TB Patients in Surabaya

Coefficient of determination (R2)

The R2 value for the treatment compliance variable of pulmonary TB patients was 0.475 or 47.5%, meaning that 47.5% of the variability in the treatment compliance variable of pulmonary TB patients is explained by the variables of

family resilience, individual beliefs, family problem solving and coping skills, individual stress, and family stress and the rest is the contribution of other variables that are not discussed in this study.

Predicted Relevance (Q2)

Based on the results of the analysis of the Q2 value, it was found that this research model is good to use, where the ability of the family resilience model in improving treatment compliance of pulmonary TB patients was 0.511 or 51.1% and can be used outside the research area.

Significance testing was used to test whether there was an effect of exogenous variables on endogenous variables. The test criteria stated that the P-Value < significant alpha 5% or 0.05, thus it is declared that exogen variables have a significant effect on endogen variables. The results of the significance and model testing can be seen in the following figures and tables:

Table 15. Hypothesis Testing Results in the Family Resilience Study as an Effort to Improve the Medication Compliance of Pulmonary TB Patients in Surabaya, August to December 2019 (n=160)

Relationship	**Coefficient of Effect**	**T Statistics (|O/STDEV|)**	***P-Value***
X1.Patient Factors -> X5 Individual Stress	0.258	3.048	0.001
X1.Patient Factors -> X6 Family Stress	0.140	2.429	0.008
X2.Family Factors -> X6 Family Stress	-0.202	2.999	0.001
X3.Social Factors -> X6 Family Stress	-0.171	2.745	0.003
X4.Family Stressors -> X6.Family Stress	0.260	3.345	0.000
X6.Family Stress -> X5.Individual Stress	0.371	4.923	0.000
X5.Individual Stress -> Y2.Individual Beliefs	-0.157	2.642	0.004
X6.Family Stress -> X7.Family Coping	-0.214	3.606	0.000
X7.Family Coping -> Y1.Resilience	0.108	2.116	0.017
Y1.Resilience -> Y2.Individual Beliefs	0.324	5.163	0.000
Y1.Resilience -> Y3.Patient Compliance	0.521	7.407	0.000
Y2.Individual Beliefs -> Y3.Patient Compliance	0.163	2.881	0.002

In Table 15, we can see that the family resilience variable is the variable that has the greatest coefficient of effect on treatment compliance of the pulmonary TB patients. Family resilience also has an effect on individual belief of pulmonary TB patients and this belief leads to treatment compliance.

4. Discussion

Family resilience has an effect of the individual belief of pulmonary TB patients in Surabaya. It has a bigger total effect on the belief of pulmonary TB patients compared to patient stress. This family resilience factor was built upon 5 construct indicators, namely survival, adaptation, acceptance, growing stronger, and helping other. The most prevalent result was most families were in the resilience phase; not quite in the helping other phase yet.

Regarding individual belief, most of the respondents had adequate perceived susceptibility related to pulmonary TB disease. The majority of respondents had the perceived severity of pulmonary TB disease in the adequate category. Most of the respondents had a perceived barrier in the adequate category. More than half of the respondents were in the good category for perceived benefit. The majority of the respondents' cues to action were in the good category. The respondents' self-efficacy was mostly in the good category.

Family resilience has an effect on individual beliefs. Family resilience is a functional adaptation and coping process within the family. Resilience involves dynamic processes that help them adapt to significant problems. This resilience or strength or available resources can enable individuals and families to succeed in dealing with crises and problems. Studying the stages of family resilience related to pulmonary TB patients and the strength or ability in each stage of self-resilience in the family is very important (Rachmawati et al., 2020). According to Lietz & Strength (2016) in Rachmawati (2019), family resilience is hoped to improve family independence in caring for family members suffering from TB with an expected outcome that patients will have a support system in the form of family during their treatment process.

Family resilience goes through 5 stages or 5 phases of resilience. The first stage is survival. The second stage is where the family begins to adapt to problems that occur, the third stage is where the family begins to accept the problems and conditions of the family, the next stage is where the family becomes stronger because they have experience in dealing with problems. The last stage is where a family is able

to help other families in dealing similar problems or difficulties (Rachmawati et al., 2020). Suhita (2005) in Hasanah (2018) showed that individuals who receive family support or have high family resilience will be more optimistic in dealing with health and life problems, and are more resourceful in meeting psychological needs (Hasanah et al., 2018).

Family support is one of the important factors in promoting self-efficacy of TB patients in undergoing treatment. Family support is very necessary as a reinforcing factor for action and providing a source of support (enabling) when the patient's self-efficacy declines during the treatment process. Family support that is very important is emotional support and self-esteem, including expressions of empathy, care and concern for the patient given by the family as the party most trusted by the patient (Hasanah et al., 2018).

According to our results, there is a relationship between family resilience and individual beliefs. The TB patients are said to have good individual beliefs and adequate family resilience. Family resilience can have a good impact on individual belief because TB patients face a lot of pressure and discomfort that can affect their psychology and physic; thus, they need direct support from trusted people, namely their families. Family resilience is also very important in the treatment of TB patients because if the family has good stages and basics and has gone through various phases of resilience, the family will be able to provide all the necessary support for TB patients so that they remain motivated and confident to undergo treatment until they recover.

Individual beliefs of family members of pulmonary TB patients have an effect on the compliance of pulmonary TB patients with treatment in Surabaya. In this study, this TB treatment compliance factor was built from 2 construct indicators, namely compliance and AFB. For individual belief, it was found that most of the respondents had sufficient perceived susceptibility related to pulmonary TB disease. The majority of respondents had the perceived severity of pulmonary TB in the adequate category. Most of the respondents had a perceived barrier in the adequate category. More than half of the respondents were in the good category for perceived benefit. The majority of the respondents' cues to action were in the good category. The respondents' self-efficacy was mostly in the good category. For medication compliance, the majority of respondents were compliant.

Novitasari's study (2017) on TB patients showed that in addition to physical factors, psychological factors such as individual understanding that can affect perceptions of the disease and during the treatment period are also important to consider. Individual beliefs in the treatment to achieve recovery from TB are crucial. Self-efficacy can be obtained, changed, increased, or decreased depending on each individual. In the face of difficulties or hardships, a person with poor self-efficacy may have slower treatment progress, loosen their effort or activity or even completely give up on the treatment. Conversely, a person with high self-efficacy may have faster treatment progress by tightening the efforts or treatment activities to achieve healing (Novitasari, 2017). Sapiq (2015) in Wulandari (2019) stated that the higher the self-efficacy of a TB patient, the more compliant they will be with the treatment they are undergoing (Fintiya & Wulandari, 2019). TB patients with high self-affixation or individual belief have the confidence and motivation to change behaviour obediently in consuming drugs so that the disease they suffer does not recur, while TB patients who have low self-efficacy because most of them feel pessimistic and resigned to their illness (Arzit et al., 2021).

According to our results, there is a relationship between individual beliefs and the compliance of TB patients. Individual belief is one of the important factors in the treatment and healing process of TB patients, because if TB patients have high confidence that they will recover, they will be strongly motivated to modify their behavior, such as being obedient in treatment, being more optimistic which can affect their psyche, which in turn has a positive effect on their physical and mental condition, so that the treatment progresses smoothly and in accordance with the purpose of healing. Thus, the higher the individual belief, the higher the compliance to treatment of TB patients in accordance with the criteria for the direction of the relationship in the direction of the evidence ($r = 0.362$).

Individuals who demonstrate confidence both in their own susceptibility to tuberculosis and in the overall benefit of treatment have the awareness to undergo treatment in an orderly manner. The group that showed less confidence experienced obstacles in committing to the pulmonary TB treatment program that is supposed to heal them. If individuals consider themselves susceptible to a condition, believe that the condition will have potentially serious consequences, believe that a course of action available to them will be beneficial in reducing their susceptibility to or severity of the condition, and believe that the anticipated benefits of taking actions are greater than the barriers (or cost), they tend to take actions they believe will reduce their risk. In the case of pulmonary TB disease which is an infectious disease and is at risk of disease severity, efforts should be made to include acceptance of the diagnosis, personal estimation of susceptibility to the consequences of the disease and susceptibility to disease in general.

Family resilience has an effect on TB patients' compliance with treatment in Surabaya. It has a greater effect on their compliance than patient belief in treatment compliance. The results of research conducted by Rachmawati et al (2020) concluded that the lower the family stress level, the better the compliance of patients carrying out pulmonary TB treatment programs, and the higher the family resilience, the higher the patient's compliance in the implementation of the TB treatment program (Rachmawati, et al., 2020). Families who see adversity as a common challenge and a natural thing in life are able to survive and rise above adversity. This is also

driven by the view that the difficulties that occur can be used as experiences for the future, the availability of resources needed to overcome the difficulties experienced is something that is valuable for family resilience. So, when a family member is sick, other family members see this as a burden and they make every effort to cure their family members (Tristiana et al., 2018). Compliance with treatment of TB patients will have an effect on increasing the success rate of treatment of TB patients (Ivana Ribka Nasedum, Merlis Simon, 2021).

In our results, there is a relationship between family resilience and the compliance of TB patients. Family resilience is the main supporting factor for the recovery of TB patients because families who have gone through various phases of susceptibility will become more experienced in overcoming problems that occur in the family. A resilient family is almost guaranteed to able to care for their sick family members. The role of the family in caring for sick family members is to provide support with various efforts, including providing motivation and reminding to comply with regular treatment until recovery is achieved. Thus, the better the level of family resilience, the higher the compliance of TB patients to treatment. The effect of family resilience is greater on medication compliance when compared to the individual pathway.

The key processes in family resilience are interaction and synergy. For example, the relational view of resilience (belief systems) supports and is reinforced by connectedness (organizational processes) and collaborative problem solving (communication processes). The creation of shared meaning occurs through the communication process. A positive outlook facilitates and is supported by successful problem solving and proactive measures. Family resilience refers to the functioning of the family system in dealing with adversity. This model also conveys that resilience does not only mean getting back up and being strong, but also signifies the existence of strength that helps sick family members and other sufferers to survive their problems and grow into stronger human beings. Resilience is not something that is discussed with a focus on the individual, but rather an interactional process between individual and family characteristics.

5. Conclusion

The conclusions drawn from the research results are: 1) patient factors and family stress have an effect on patient stress, and patient stress has an effect on patient belief in undergoing the treatment process and patient belief has an effect on medication compliance. 2) patient factors, family factors, social factors, and family stressors have an effect on the onset of family stress, and family stress has an effect on family problem solving and coping skills. Furthermore, problem solving and coping skills have an effect on family resilience which then affect individual belief as well as the compliance of pulmonary TB patients with treatment. 3) the effect of family resilience model on the medication compliance of pulmonary TB patients in Surabaya can be explained by family resilience and through pulmonary TB patient belief. Family resilience is composed of individual factors of pulmonary TB patients, family factors, social factors, family stressors, family stress, and the family's ability to solve problems and develop coping.

6. Suggestions

1. The role of health workers is also the key to successful treatment of pulmonary TB patients. The trust that grows in the interaction of health workers with their families is needed in the interventions provided to support the success of treatment of pulmonary TB patients.

2. The results showed that improved family resilience had a better effect on medication complications compared to internal sources of pulmonary TB patients. Therefore, intervention in the form of family nursing care through home visits is needed in the treatment program for pulmonary TB patients. Interventions to enhance family resilience until they are independent in carrying out the health care function of family members suffering from pulmonary TB are very much needed.

3. The results of the study indicate that there are other factors outside the study that also influence compliance with pulmonary TB treatment. Several factors that also need to be researched and explored are health service factors and community support.

4. Our study also did not differentiate family factors which may have an effect on compliance, such as family types, patient's position in family and family structure and roles, whose roles require further study related to family resilience and pulmonary TB treatment compliance. The model in this study has a fairly good prediction in improving the compliance of pulmonary TB patients, making it suitable to be applied in other areas and also for other types of diseases, communicable and non-communicable, as a model development and testimony.

References

1. Arabiat, D., Whitehead, L., Foster, M., Cert, P. G. D., Shields, L., Fellow, C., & Harris, L. (2018). Parents experiences of Family Centred Care practices. Journal of Pediatric Nursing, 42, 39–44. https://doi.org/10.1016/j.pedn.2018.06.012
2. Arzit, H., Asmiyati, & Erianti, S. (2021). Hubungan Self Efficacy dengan Kepatuhan Minum Obat pada Pasien TB Paru. Jurnal Medika Hutama, 2(2), 429–438.
3. Chapin, M. G. (2015). Deployment and Families : Hero Stories and Horror Stories Smith College Studies in Social Work, (July 2009). https://doi.org/10.1080/00377310903130316
4. Friedman, M. (2014). Buku Ajar Keperawatan Keluarga; Risert, Teori, dan Praktik. (E. Tiar, Ed.) (Edisi 5). Jakarta: EGC.
5. Joanna Rowe Kaakinen, Vivian Gedaly Duff, Deborah Padgett Coehlo, Shirley May Harmon Hanson. (2015). Family Health Care Nursing (edisi 5). Philadelphia: F.A.Davis Company.
6. Kaulagekar-nagarkar, Aarti, D. D. and P. J. (2012). Perspective of

Tuberculosis Patients on Family Support and Care in Rural Maharasthra. Indian Journal of Tuberculosis, 59(655), 224–230.
7. Kaulagekar-nagarkar, A., Dhake, D., & Jha, P. (2012). Perspective Of Tuberculosis Patients On Family Support And Care In Rural Maharashtra, 411007, 224–230.
8. Kementerian Kesehatan Republik Indonesia. (2016). Profil Kesehatan Indonesia.
9. Kementerian Kesehatan Republik Indonesia. (2014). Pedoman Nasional Pengendalian Tuberkulosis. Jakarta: Kementrian Kesehatan RI.
10. Kementerian Kesehatan Republik Indonesia. (2014). Strategi Nasional Pengendalian Tb Di Indonesia 2010-2014.
11. Lietz, C. A. (2017). Strengths-Based Supervision : Supporting Implementation of Family-Centered Practice through Supervisory Processes, (December 2013).
12. Lietz, C. A. (2018). Theoretical adherence to family centered practice : Are strengths-based principles illustrated in families A descriptions of child welfare services ?, (February). https://doi.org/10.1016/j.childyouth.2010.12.012
13. Lietz, C. A., Lacasse, J. R., & Cacciatore, J. (2011). Social Support in Family Reunification : A Qualitative Study Journal of Family Social Work Social Support in Family Reunification : A Qualitative Study, (January), 1–20. https://doi.org/10.1080/10522158.2011.531454
14. Lietz, C. A., & Strength, M. (2016). Stories of Successful Reunification : A Narrative Study of Family Resilience in Child Welfare, (June). https://doi.org/10.1606/1044-3894.4102
15. Li-Yun Lee, Heng-Hsin Tung, Shu-Ching Chen, C. F. (2017). Perceived stigma and depression in initially diagnosed pulmonary tuberculosis patients. Journal of Clinical Nursing, 26(23–24), 4813–4821. https://doi.org/10.1111/jocn.13837
16. Novitasari, R. (2017). Hubungan Efikasi Diri Dengan Kepatuhan Minum Obat Pada Pasien TB Paru Di Puskesmas Patrang Kabupaten Jember. Program Studi Ilmu Keperawatan Universitas Jember. https://repository.unej.ac.id/handle/123456789/85231
17. Prakash Chandra, Sangita Singh, B. . S. (2011). Study of Psychiatric Co-Morbidity in Cases of Tuberculosis, Patient Undergoing Treatment. Indian Journal of Public Health Research & Development, 2(July). Retrieved from https://www.researchgate.net/publication/273260878%0AEvaluation
18. Rachmawati, D. S., Nursalam, N., Amin, M., & Hargono, R. (2020). Developing Family Resilience Models: Indicators and Dimensions in the Families of Pulmonary TB Patients in Surabaya. Jurnal Ners, 14(2), 165. https://doi.org/10.20473/jn.v14i2.16549
19. Rachmawati, D. S., Priyantini, D., & Aini, Q. (2020). Family factors and their relation to the treatment adherence of pulmonary TB patients in Surabaya. Jurnal Ners, 15(2), 45–49. https://doaj.org/article/6a065094b1da4832bdeae816cc1e69a5
20. Rachmawati, D. S., Nursalam, N., Amin, M., & Hargono, R. (2020). Developing Family Resilience Models: Indicators and Dimensions in the Families of Pulmonary TB Patients in Surabaya. Jurnal Ners, 14(2), 165. https://doi.org/10.20473/jn.v14i2.16549
21. Rachmawati, T., & L., T. (2006). Pengaruh Dukungan Sosial Dan Pengetahuan Tentang Penyakit TB Terhadap Motivasi Untuk Sembuh Penderita Tuberkulosis Paru Yang Berobat Di Puskesmas. In Buletin Penelitian Sistem Kesehatan (Vol. 9, Issue 3 Jul). https://doi.org/10.22435/bpsk.v9i3
22. Rakhmawati, W., Nilmanat, K., & Hatthakit, U. (2019). Moving from fear to realization: Family engagement in tuberculosis prevention in children living in tuberculosis Sundanese households in Indonesia. International Journal of Nursing Sciences, 6(3), 272–277. https://doi.org/10.1016/j.ijnss.2019.06.002
23. Samal, J. (2016). Role of families in tuberculosis care : A case study, (July), 5–8. https://doi.org/10.4103/0975-9727.185020
24. Wagnild, G.M, & Young, H. . (1993). Development and Psychometric Evaluation of The Resilience Scale. Journal of Nursing Measurement, 1, 165–178.
25. Walsh, F. (2007). strengthening Family Resilience (edisi 2). New York: The Guilford Press.
26. WHO. (2017). Global Tuberculosis Report. Geneva: WHO.