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ORIGINAL ARTICLE

Perceived Stigma Outranks Social Support and Self-Esteem in Tuberculosis Quality of Life: A Nurse-Led Community Empowerment Diagnosis, Banjarmasin

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ABSTRACT

Background: Tuberculosis in Indonesia is a social as much as a biological problem, but empowerment programmes target adherence rather than stigma, and no South Kalimantan study has ranked the psychosocial determinants a nurse-led programme could act on.

Objective: To rank perceived tuberculosis stigma, perceived social support and self-esteem by their association with quality of life among adults receiving treatment for pulmonary tuberculosis, so that a nurse-led community empowerment programme can act on the determinant that carries the greatest weight.

Methods: Cross-sectional community diagnosis of 102 adults with pulmonary tuberculosis at the Lung Center ward and DOTS polyclinic, Ulin Regional General Hospital, Banjarmasin. Perceived and internalised tuberculosis stigma (28-item Indonesian scale), quality of life (WHOQOL-BREF-derived), perceived social support (MSPSS) and self-esteem (Rosenberg scale) were measured. Multiple linear regression was used, and the standardised coefficients were contrasted using the covariance matrix recovered from the collinearity diagnostics and selected by the identity $R^2 = \beta' R \beta$.

Results: Severe stigma affected 94.1%; the three stimuli explained 80.6% of the variance in quality of life ($R^2 = 0.806$): stigma $\beta = -0.766$ (95% CI −0.862 to −0.670; partial $r = -0.848$), self-esteem $\beta = 0.229$ (partial $r = 0.423$) and social support $\beta = 0.201$ (partial $r = 0.401$), all $p < 0.001$. Stigma outranked self-esteem by 0.537 and social support by 0.565 standardised units (both $p < 0.001$, in all 16 admissible reconstructions), while the two contextual stimuli did not differ ($p = 0.716$).

Conclusion: Perceived stigma is the dominant modifiable correlate of quality of life in this catchment, and the ranking is tested rather than asserted. Nurse-led empowerment should place stigma reduction through kader, family psychoeducation and survivor peer educators ahead of individual counselling, monitoring the continuous score.

HIGHLIGHTS

- Community diagnosis of 102 adults treated for pulmonary tuberculosis in Banjarmasin.
- Severe perceived stigma affected 94.1% of the participants.
- Stigma, support and self-esteem explained 80.6% of quality-of-life variance.
- Stigma outranked both other determinants on a formal contrast test ($p < 0.001$).
- Categorising the stigma score caps any association a programme could monitor.

1. Introduction

Pulmonary tuberculosis remains one of the largest infectious-disease burdens in the world and Indonesia carries the second-largest national share of it, with the disease concentrated in households and neighbourhoods rather than distributed at random[1,2], a pattern that comparative analyses of national tuberculosis burden using global burden-of-disease metrics reproduce across high-incidence settings[1]. Programme data from Kalimantan itself carry the same signal: a spatio-temporal analysis of pulmonary tuberculosis in Astambul, in the Banjar district catchment adjoining Banjarmasin, shows notified cases clustering rather than dispersing across the district, and a provincial study of treatment interruption in Kalimantan identifies the patient-side factors that keep treatment completion below the national elimination targets[3,4]. What those programme figures do not capture is the social cost carried by the people who are found and treated. Multi-site Indonesian evidence shows that a large majority of people with tuberculosis experience stigma, that stigma travels with depression, and that the

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combination degrades health-related quality of life far beyond what the bacteriology predicts[5,6]. Indonesian series in drug-resistant disease show the same pattern from three directions: anxiety and depression are common, health-related quality of life is depressed across SF-36 domains, and the medication burden is itself a source of distress[7–9]; and observational work in tertiary care shows how far the disease reaches into daily functioning even while treatment is proceeding[10,11]. Community empowerment and education programmes in tuberculosis, however, still concentrate largely on medication adherence, and the psychosocial and peer-led interventions that do target stigma have only recently been pooled[12,13].

The theoretical anchor for this study is the Roy Adaptation Model, which treats health as the outcome of how effectively a person copes with stimuli that are classified as focal, contextual or residual[14]. Reading community stigma as the *focal* stimulus — the one confronting the person most directly — and perceived social support and self-esteem as *contextual* stimuli that modify the response gives an empowerment programme a rank order to work with, but only if that rank order is measured rather than assumed. The model is compatible with the wider biopsychosocial account of chronic illness, in which the social response to a diagnosis is a causal input to health rather than a by-product of it[15]. The model also has an active recent trial literature — nursing interventions built on it have improved physiological and psychosocial adaptation after stroke, medication adherence and psychosocial adjustment in vascular disease, and quality of life in elderly burn patients[16–18] — and it is consistent and with the stigma framework of Link and Phelan, in which labelling, stereotyping, separation, status loss and discrimination form a sequence that a community intervention can interrupt[19,20]. Empowerment theory adds the final step: the point of measuring a determinant is to hand the community a lever it can actually pull[21,22].

The evidence base linking these constructs is substantial but has a specific hole in it. Cross-sectional studies in China have shown that experienced stigma predicts distress and reduced quality of life, and that self-esteem moderates that pathway[23,24]; three further cross-sectional series, from Nigeria, Pakistan and India, report the same triad of stigma, social support and quality of life with effects in the moderate range[25–27]; reviews of health-related quality of life in tuberculosis converge on stigma, social support and treatment burden as its main psychosocial correlates[10,28]; treatment-phase studies show that quality of life in tuberculosis is a moving curve rather than a fixed state, rising as sputum converts under directly observed therapy[29,30]; and regional series — Indonesian, Malaysian, Korean and Indian — report the same associations for family support, self-care, self-esteem and post-treatment quality of life[11,30–34]. What almost none of them do is ask which determinant is *largest*. Where a comparative claim is made, it is made by inspecting coefficients side by side rather than by testing the difference between them — a practice that has recently been shown to overturn published conclusions in exactly this literature, including in the psychosocial tuberculosis literature itself, where reviews rank determinants of quality of life by effect magnitude across studies without ever testing whether the ranked quantities differ[10,28] and where the relative-importance methods that would settle the question are almost never applied[35]. Two things separate the present study from that one. Substantively, it examines quality of life in people receiving tuberculosis treatment in a hospital catchment rather than coping in women recruited through cancer support organisations, and its comparative claim survives its own test where the earlier one did not. Methodologically, it adds a measurement result that the earlier study had no occasion to produce: the ceiling that the routine three-level categorisation of a stigma score imposes on any association it can show, which decides what a programme is able to monitor.

Ulin Regional General Hospital, Banjarmasin is the class A teaching referral hospital for South Kalimantan; its Lung Center ward and DOTS outpatient clinic together form the provincial funnel through which people with pulmonary tuberculosis pass on their way back into their kelurahan. That makes its patient population an unusually efficient sampling frame for a community diagnosis: the people seen there are drawn from the five *kecamatan* of Banjarmasin and the surrounding districts, and are expected — though residence and insurance status were not recorded in this study — to return to the *kelurahan, kader* and *Puskesmas* structures through which any stigma-reduction programme would have to operate, and to have their hospital care paid inside the INA-CBG packages of BPJS Kesehatan. The city's riverine settlement pattern along the Martapura and Barito, with dense stilt housing and high household crowding, bears on both halves of the problem: housing density, indoor humidity and ventilation are established environmental risk factors for pulmonary tuberculosis in Indonesian case-control work, a transmission model built for Banjar district treats the housing environment as an explicit input, and crowding is also what makes illness visible to neighbours, which is the condition on which labelling depends[22,36,37]. No published study has quantified the relative weight of community stigma, perceived social support and self-esteem on quality of life in this catchment, which leaves nurse-led programme design in South Kalimantan without a priority ordering.

This study therefore had three aims: to quantify the burden of community stigma, perceived social support, self-esteem and quality of life among people with pulmonary tuberculosis at Ulin Regional General Hospital, Banjarmasin; to estimate the independent association of each psychosocial stimulus with quality of life; and to determine, by formal statistical test, which stimulus a nurse-led empowerment programme should address first. The novelty of this study lies in converting a descriptive correlational survey into a programme-ranking instrument. The ranking of one determinant above another is established by a formal contrast of standardised regression coefficients rather than by

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visual comparison; the covariance that test requires is recovered from the study's own collinearity diagnostics and is then selected, rather than assumed, by the algebraic identity that the standardised system must satisfy; the ranking is shown to hold across every reconstruction the reported statistics admit; and the result is translated into a measurable empowerment specification anchored in the structures that already exist in Banjarmasin, together with the monitoring instrument that specification would need.

2. Methods

2.1. Study design and reporting

This was an analytical cross-sectional study with a correlational approach, conducted as a community diagnosis: the design measures the standing of a defined population on a set of modifiable determinants so that an intervention can be prioritised. Reporting follows the STROBE statement for cross-sectional studies[38] with two declared departures. STROBE item 13 cannot be met, because the source record contains no screening, eligibility or refusal counts; and STROBE item 16 does not apply, because no confounder adjustment was possible — age, sex, education and illness duration were recorded but no model containing them exists in the record and none can be fitted without the participant-level data. The participant flow is shown in **Figure 2**, and the conceptual model the analysis operationalises is shown in **Figure 1**.

2.2. Ethical approval

The study protocol received ethical approval from the Health Research Ethics Committee of Universitas Muhammadiyah Banjarmasin in April 2026 (approval number 129/UMB/KE/IV/2026) and from the Research Ethics Committee of Ulin Regional General Hospital, Banjarmasin in May 2026 (approval number 73/V-Reg Riset/RSUDU/2026). Written informed consent was obtained from every participant after the purpose, procedures and voluntary nature of the study had been explained; a formal refusal form was available so that declining carried no consequence for care. Responses were recorded under initials only and were reported in aggregate. The study was conducted in accordance with the Declaration of Helsinki.

2.3. Setting and participants

The study was conducted in the Lung Center ward and the DOTS outpatient clinic of Ulin Regional General Hospital Banjarmasin, a class A teaching hospital in Banjarmasin, South Kalimantan. The source population used for the sample-size calculation was a count of 136 people with pulmonary tuberculosis taken from the Lung Center ward's visit records on 11 December 2025. That count is a single-day ward enumeration, not a register of the study period, and the analysed participants cannot be shown to be a subset of it; no response fraction is therefore reported. Eligible participants were adults older than 18 years with a record-confirmed diagnosis of pulmonary tuberculosis who were conscious, cooperative, clinically stable, able to communicate verbally and in writing, and willing to give written consent. People with cognitive impairment, severe mental illness or reduced consciousness, those who were clinically unstable or presenting as an emergency, and those who declined or withdrew were excluded. Data were collected between April and May 2026, with participant recruitment beginning after the hospital's ethical approval was issued in May 2026. Recruitment was non-probability and consecutive: every eligible person encountered in the ward and the clinic during the fieldwork period was invited, without randomisation.

2.4. Sample size

The target sample size was obtained from the Slovin formula applied to the source population with a 5% margin of error, shown as Equation 1:

$$n = N / (1 + N e^2) \quad (1)$$

With N = 136 and e = 0.05 this gives n = 136 / (1 + 136 × 0.05^2) = 101.49, rounded up to 102, which is the realised sample size and equals 75.0% of the enumerated source population. The Slovin formula presupposes probability sampling, which this study did not use, so the figure is a recruitment target rather than a guarantee of probability-sample precision, and the percentage is a coverage figure rather than a response rate. The smallest effects the realised design can detect are reported in the Results.

2.5. Instruments

Four self-report instruments were administered, all in Bahasa Indonesia, all completed by the participant at a single sitting. Stigma was measured with the 28-item Indonesian tuberculosis stigma scale, comprising 12 self-stigma items, 5 public-stigma items, 7 behavioural or discrimination items and 4 positively worded items, each answered on a four-point agreement scale[5,39]. The instrument is completed by the patient, so what it measures is stigma as the patient perceives and internalises it, not the attitudes or behaviour of community members; the construct is named accordingly throughout this article, and the scale's separate community-perspective form was not administered[40]. Quality of life was measured with a 26-item questionnaire derived from the WHOQOL-BREF, covering physical health (6 items), psychological health (6 items), social relationships (3 items) and environment (9 items) on a five-point scale[41]. Perceived social support was measured with the 12-item Multidimensional Scale of Perceived Social Support in its Indonesian version, with four items each for family, friends and significant other on a seven-point scale[42]. Self-esteem was measured with the 10-item Rosenberg Self-Esteem Scale in its Indonesian adaptation, five positively and five negatively worded items on a four-point scale with the negative items reverse-scored[43]. **Table 3** sets out the scoring rules, the category cut-points as applied, and what reliability evidence exists for each instrument.

The reliability evidence needs to be stated precisely, because it is weaker than a conventional psychometrics

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paragraph would imply. **No internal-consistency coefficient was computed in the present sample for any of the four instruments**, and none is claimed. For the stigma scale, the Indonesian cross-cultural adaptation reports Cronbach's α ≥ 0.70[39]. For the quality-of-life instrument, the Rasch-model evaluation of the WHOQOL-BREF in Indonesian tuberculosis patients reports coefficients above 0.89 for several domains[41]; a Rasch analysis yields person and item separation reliability rather than Cronbach's α, and no reliability estimate exists for the total score that this analysis actually used. For the MSPSS, the source record quotes α ≈ 0.837 from an unnamed psychometric report and attaches it to the **four-item family subscale**, whereas the analysis uses the twelve-item mean; a four-item subscale coefficient is not a twelve-item scale coefficient, so the figure is reported here with the subscale it belongs to and is not claimed for the score that was analysed. The Indonesian validation of the full twelve-item instrument supports its three-factor structure in a general adult sample[42]. For the Rosenberg scale, the Indonesian confirmatory factor analysis reports all item loadings significant at $t > 1.96$[43], which is evidence of unidimensionality and **not** evidence of reliability; no reliability coefficient for that instrument is available. These gaps are carried forward into the Limitations, because one line of argument in the Discussion turns on the relative measurement precision of the three predictors and cannot be settled without them.

Two scoring rules govern the analysis and are stated here in full, because the source record describes them only in part. First, the four positively worded items of the stigma scale are reverse-scored before summation, so that a higher total always denotes greater stigma; the twenty-four remaining items are scored 4 for strong agreement down to 1 for strong disagreement. Second, the stigma and quality-of-life totals are linearly transformed onto a 0–100 metric before the category cut-points of **Table 3** are applied, by the standard transformation given in Equation 2:

$$S = [\,(X - X_{min}) / (X_{max} - X_{min})\,] \times 100 \qquad (2)$$

where X is the raw summed score, X_{min} = 28 and X_{max} = 112 for the 28-item stigma scale, and X_{min} = 26 and X_{max} = 130 for the 26-item quality-of-life questionnaire. This is the transformation the WHOQOL family uses, and it is the only rule under which the printed cut-points span either instrument; without it the stigma bands leave scores of 101 to 112 unclassified. Perceived social support was analysed as the twelve-item mean on the original 1–7 metric, which is the score the source's operational-definition table names and the metric its cut-points assume, and self-esteem as the raw 10–40 total. The category boundaries are reported exactly as applied in **Table 3**; the Rosenberg boundaries are the conventional ones for the 0–30 scoring of that scale and are identified as such.

2.6. Data collection

Administrative permission was obtained from the postgraduate directorate of Universitas Muhammadiyah Banjarmasin and from the director of Ulin Regional General Hospital, Banjarmasin before fieldwork began. The researcher coordinated with the hospital training division and with the head nurse of the Lung Center ward, who assisted in explaining the purpose of the study to patients. A readability check of the instruments was carried out with patients before administration. Participants who consented completed the four questionnaires with the researcher present to explain the completion procedure. The source record does not state how long administration took, whether any items were read aloud for participants with limited literacy, or whether questionnaires were completed at the bedside or in the outpatient clinic; those details are therefore not reported here.

2.7. Statistical analysis

The analyses reported in the source record were performed in IBM SPSS Statistics, whose version the record does not state. Every quantity that the source does not print — each confidence interval, effect size, contrast, bound and detection threshold below — was computed for this article in Python 3.11 with NumPy and SciPy, from the statistics the source prints; the script is supplied as supplementary material. Categorical variables are summarised as counts and percentages with Wilson score 95% confidence intervals. Distributional screening used the one-sample Kolmogorov–Smirnov test, reported here as description rather than as a decision rule: marginal non-normality of a predictor or an outcome violates no assumption of ordinary least squares, whose assumption concerns the conditional distribution of the errors. Spearman's rank correlation was used for the bivariate associations because of the ceiling in the stigma distribution rather than because of the screening result; summed Likert totals of this length behave as continuous variables under parametric analysis, so the regression on the total scores is not a violation[44]. The 95% intervals for ρ use the Bonett–Wright standard error. Differences between two rank correlations sharing the quality-of-life variable were tested with Steiger's test for dependent overlapping correlations. Multivariable analysis used ordinary least squares regression of the quality-of-life score on the three psychosocial variables, with tolerance and the variance inflation factor for multicollinearity and the Glejser regression of the absolute residuals for heteroscedasticity; both of the latter are reported as weak evidence, since neither has much power at n = 102.

Four additions were made to the analysis in the source record, all computed from the statistics it prints and none requiring participant-level data. First, effect sizes were attached to every estimate: squared semipartial and partial correlations, Cohen's local f^2, and the Cohen's d re-expression of each partial correlation, each with a 95% confidence interval. The d re-expression is Equation 3:

$$d = 2r / \sqrt{(1 - r^2)} \qquad (3)$$

Cohen's d is used here only as this monotone re-expression of a partial correlation between two continuous variables; it is not a standardised mean

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difference between groups and must not be read as one. Second, the covariance matrix of the standardised regression coefficients was recovered. For a model with k predictors the sampling covariance of the standardised coefficients is Equation 4,

$$\mathbf{Cov}(\boldsymbol{\beta}) = c \cdot \mathbf{R}^{-1}, \quad c = (1 - R^2) / (n - k - 1) \qquad (4)$$

where **R** is the correlation matrix of the predictors, and for three predictors the printed tolerance values constrain **R** through the determinant identity of Equation 5:

$$\text{tolerance}_j = \det(\mathbf{R}) / \det(\mathbf{R}_{-j}), \quad \det(\mathbf{R}) = 2(1 - r_{12}\, r_{13}\, r_{23}) / (\Sigma\, \text{VIF} - 1) \qquad (5)$$

That system does **not** identify **R** uniquely: it fixes the three correlation magnitudes only up to two admissible roots and leaves the sign pattern free except for the sign of the product $r_{12}r_{13}r_{23}$, giving 8 admissible positive-definite matrices for each tolerance vector. The matrix was therefore selected from that set by a constraint the reported statistics must satisfy rather than by assumption: for standardised least squares the closure identity of Equation 6 holds exactly,

$$R^2 = \boldsymbol{\beta}' \mathbf{R} \boldsymbol{\beta} \qquad (6)$$

and only the configurations satisfying it can have produced the printed output. Third, the difference between two standardised coefficients was tested with a t statistic on n − k − 1 degrees of freedom, using Equation 7 with the contrast vector **L**:

$$t = \mathbf{L}'\boldsymbol{\beta} / \sqrt{(\mathbf{L}'\, \mathbf{Cov}(\boldsymbol{\beta})\, \mathbf{L})} \qquad (7)$$

This is an approximation, because Equation 4 treats the standard deviations used in standardising as known constants when they are estimated; a 20,000-replication Monte Carlo at this sample size and this R^2 gives the direction and size of the error and is reported in the Results. Fourth, the smallest effects the realised design can detect at 80% power and α = 0.05 were computed by inverting the non-central F distribution, using Cohen's convention $\lambda = f^2(u + v + 1)$ and the relation $f^2 = sr^2/(1 - R^2)$ that holds for one predictor inside a fitted model.

All tests were two-sided with α = 0.05; exact p values are reported to three decimal places and values below 0.001 as $p < 0.001$. **Post-hoc observed power was deliberately not computed**, because it is a monotone function of the p value and adds no information. No subgroup analysis was attempted: with one adolescent, one participant in higher education and no participant at all in the mild-stigma band, no stratified estimate in this data set is identified, and none is reported.

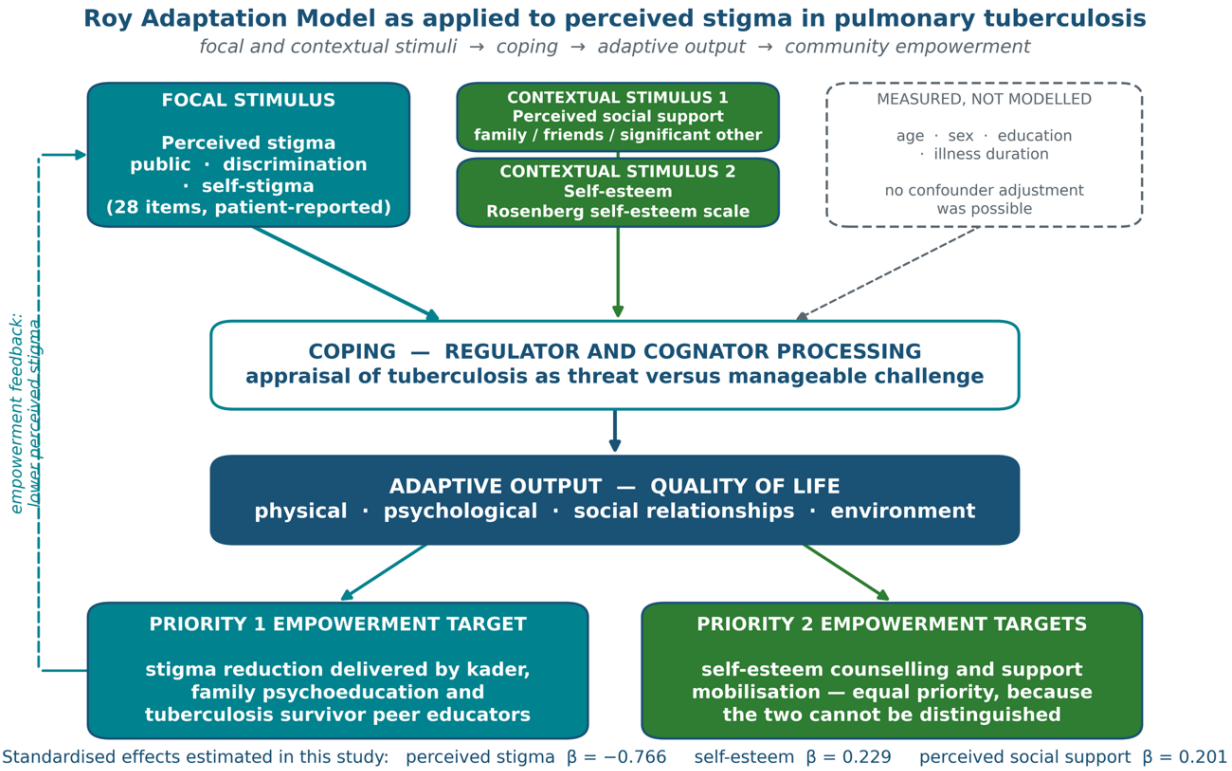

Figure 1. Conceptual framework. The Roy Adaptation Model as applied in this study: patient-reported stigma treated as the focal stimulus, perceived social support and self-esteem as contextual stimuli, quality of life as the adaptive output, and the two empowerment targets that follow from the tested ranking. Two caveats belong with the figure. In Roy's own scheme self-esteem belongs to the self-concept mode and perceived social support to the interdependence mode, so treating them as stimuli follows the source's model rather than Roy's definitions and risks conditioning on mediators. Age, sex, education and illness duration were measured but not modelled; no confounder adjustment was possible.

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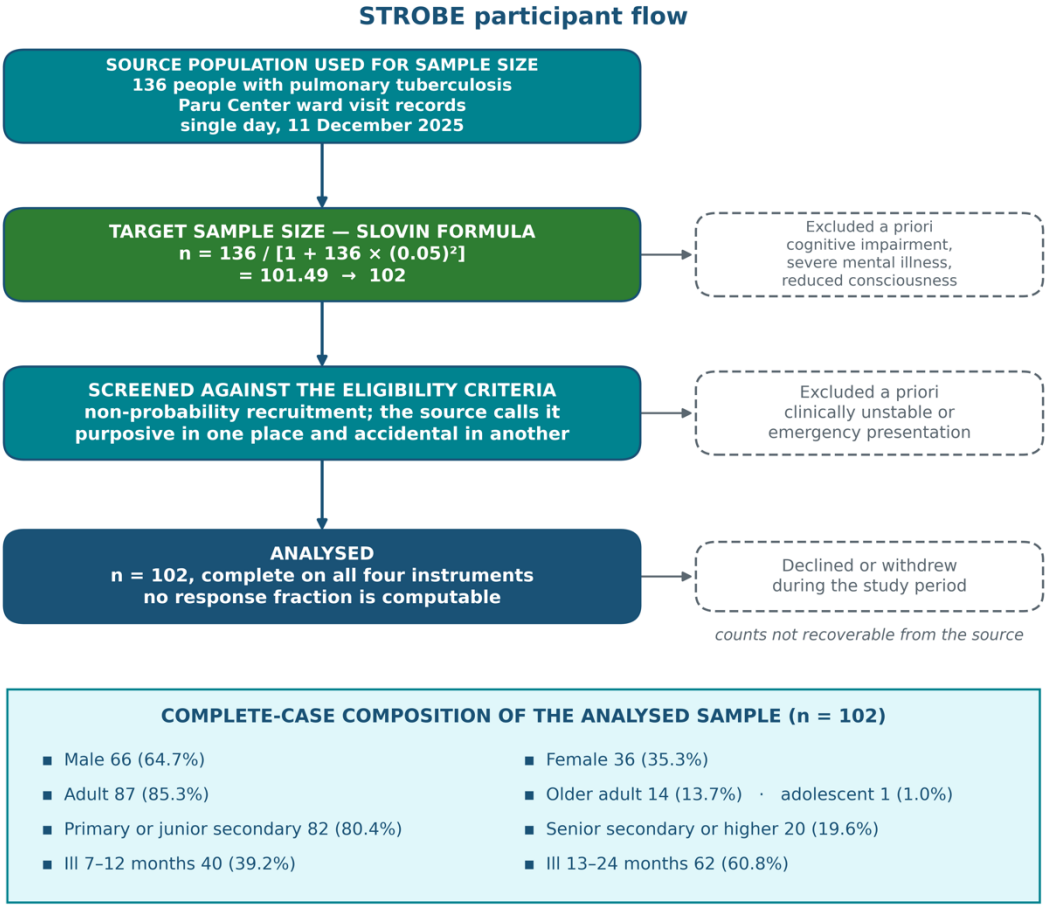

Figure 2. STROBE participant flow. The source records no screening, refusal or exclusion counts and no data-collection dates, and the 136 is a single-day ward count taken before the study period rather than a register of it, so no response fraction is shown. The figure states only what the record contains.

3. Results

3.1. Participant characteristics

All 102 participants completed all four instruments; there were no missing data. The composition of the sample is detailed in **Table 1**. Men predominated, 66 (64.7%, 95% CI 55.1–73.3), and almost the entire sample fell in the adult age band, 87 (85.3%, 95% CI 77.1–90.9), with 14 (13.7%, 95% CI 8.4–21.7) older adults and a single participant in the adolescent band. The source record classifies age by the Indonesian life-stage bands rather than by year of age, and the *remaja* band overlaps the adult eligibility threshold, so that participant is not an eligibility violation; the numerical boundaries are not stated in the record and are not reported here. Educational attainment was concentrated at the lower end: 42 (41.2%, 95% CI 32.1–50.9) had completed primary school only and 40 (39.2%, 95% CI 30.3–48.9) junior secondary, so that 82 (80.4%, 95% CI 71.6–86.9) of participants had not progressed beyond junior secondary and one had entered higher education. The majority had been ill for more than a year, 62 (60.8%, 95% CI 51.1–69.7) reporting 13 to 24 months of illness against 40 (39.2%, 95% CI 30.3–48.9) reporting 7 to 12 months. Occupation was named in the source's analysis plan but is not reported in its results and is not recoverable.

Table 1. Characteristics of the 102 participants with pulmonary tuberculosis, Lung Center ward and DOTS polyclinic, Ulin Regional General Hospital, Banjarmasin.

Characteristic	Category	n	%	95% CI (%)
Age band	Adolescent	1	1.0	0.2–5.3
	Adult	87	85.3	77.1–90.9
	Older adult	14	13.7	8.4–21.7
Sex	Male	66	64.7	55.1–73.3
	Female	36	35.3	26.7–44.9
Education	Primary school	42	41.2	32.1–50.9
	Junior secondary	40	39.2	30.3–48.9

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Characteristic	Category	n	%	95% CI (%)
	Senior secondary	19	18.6	12.3–27.3
	Higher education	1	1.0	0.2–5.3
Illness duration	7–12 months	40	39.2	30.3–48.9
	13–24 months	62	60.8	51.1–69.7

3.2. Distribution of the four study variables

The distribution of each construct is detailed in **Table 2**. The most striking finding of the community diagnosis is the near-universality of severe stigma: 96 (94.1%, 95% CI 87.8–97.3) of participants scored in the severe band and 6 (5.9%, 95% CI 2.7–12.2) in the moderate band, while no participant at all scored in the mild band. Quality of life was almost evenly split, with 51 (50.0%, 95% CI 40.5–59.5) in the good category, 47 (46.1%, 95% CI 36.7–55.7) in the poor category and only 4 (3.9%, 95% CI 1.5–9.7) in the intermediate category — a near-empty middle band that makes the outcome distribution effectively bimodal, and that is the direct explanation for the large Kolmogorov–Smirnov statistic reported below. Perceived social support was most often moderate, 68 (66.7%, 95% CI 57.1–75.1), with 27 (26.5%, 95% CI 18.9–35.8) high and 7 (6.9%, 95% CI 3.4–13.5) low. Self-esteem followed the same shape: 61 (59.8%, 95% CI 50.1–68.8) moderate, 34 (33.3%, 95% CI 24.9–42.9) high and 7 (6.9%, 95% CI 3.4–13.5) low. The modal participant therefore carries severe perceived stigma while holding only moderate social support and moderate self-esteem, a configuration the Roy model predicts will strain coping.

Table 2. Distribution of quality of life, perceived stigma, perceived social support and self-esteem (n = 102).

Construct	Category	n	%	95% CI (%)
Quality of life	Good	51	50.0	40.5–59.5
	Moderate	4	3.9	1.5–9.7
	Poor	47	46.1	36.7–55.7
Perceived stigma	Mild	0	0.0	0.0–3.6
	Moderate	6	5.9	2.7–12.2
	Severe	**96**	**94.1**	87.8–97.3
Perceived social support	Low	7	6.9	3.4–13.5
	Moderate	68	66.7	57.1–75.1
	High	27	26.5	18.9–35.8
Self-esteem	Low	7	6.9	3.4–13.5
	Moderate	61	59.8	50.1–68.8
	High	34	33.3	24.9–42.9

No participant scored in the mild community-stigma band.

3.3. Distributional screening

The instrument profile, the scoring rules as applied and the distributional screening are all detailed in **Table 3**. All four total scores departed from normality at n = 102: quality of life D = 0.323, stigma D = 0.162, perceived social support D = 0.096 and self-esteem D = 0.154. The source's df column carries the sample size rather than a degrees-of-freedom parameter. The significance values as printed are not internally consistent: the smallest statistic in the table is reported with the smallest p value. A Monte-Carlo Lilliefors reference distribution at n = 102 (40,000 draws, 95th percentile 0.0885) returns p = 0.021 for D = 0.096 and p < 0.001 for D = 0.162, which shows that the two printed p values are **transposed** rather than merely mis-transcribed. This is recorded in the audit of the source record below and changes no conclusion, since all four statistics exceed the critical value.

Table 3. Instrument profile, scoring rules as applied, reliability evidence, and distributional screening.

Instrument (construct measured)	Items and response scale	Category cut-points as applied	Reliability evidence — and its limits	K–S D	n	p	p (Lilliefors)
Indonesian tuberculosis stigma scale — **patient-reported** perceived and internalised stigma	28 items; 4-point agreement scale; 12 self-stigma, 5 public stigma, 7 behavioural or discrimination, 4 positively worded	Mild < 55; moderate 56–75; severe 76–100 (raw total range 28–112, so the cut-points must be a percentage transformation that the source does not describe)	Cronbach's α ≥ 0.70 in the Indonesian cross-cultural adaptation, in both the patient and the community perspective. Not computed in this sample.	0.162	102	0.022	< 0.001

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Instrument (construct measured)	Items and response scale	Category cut-points as applied	Reliability evidence — and its limits	K–S D	n	p	p (Lilliefors)
WHOQOL-BREF-derived questionnaire — quality of life	26 items; 5-point scale; physical 6, psychological 6, social relationships 3, environment 9	Poor < 55; moderate 56–75; good ≥ 76 (raw total range 26–130; same transformation problem)	Rasch-model evaluation in Indonesian tuberculosis patients reports coefficients above 0.89 for several domains. Rasch yields separation reliability, not Cronbach's α, and **no reliability estimate exists for the total score that was analysed**.	0.323	102	< 0.001	< 0.001
MSPSS, Indonesian version — perceived social support	12 items; 7-point scale; family 4, friends 4, significant other 4	Low 1.0–2.9; moderate 3.0–5.0; high 5.1–7.0	α ≈ 0.837, quoted in the source from an unnamed report and attached to the **four-item family subscale**, not to the 12-item scale. The source does not state unambiguously which score entered the model.	0.096	102	< 0.001	0.021
Rosenberg Self-Esteem Scale, Indonesian adaptation — self-esteem	10 items; 4-point scale; 5 positive and 5 negative items, negatives reverse-scored; unidimensional	Low < 15; moderate 15–25; high > 25 (these are the conventional boundaries for 0–30 scoring, applied here to 10–40 scoring, whose midpoint is 25)	Indonesian confirmatory factor analysis reports all item loadings significant at t > 1.96. That is evidence of unidimensionality, **not of reliability; no reliability coefficient is available for this instrument**.	0.154	102	< 0.001	< 0.001

K–S = one-sample Kolmogorov–Smirnov test of the total score.

3.4. Bivariate associations with quality of life

The Spearman correlations are detailed in **Table 4**. Stigma was strongly and negatively associated with quality of life, ρ = −0.720 (95% CI −0.811 to −0.596), sharing 51.8% of its rank variance. Self-esteem was moderately and positively associated, ρ = 0.521 (0.352 to 0.657), and perceived social support positively but more weakly, ρ = 0.345 (0.156 to 0.510). All three intervals exclude zero and all three p values were below 0.001. The ordering among them was tested rather than read off the intervals, using Steiger's test for dependent overlapping correlations with the recovered predictor correlations: stigma exceeds self-esteem in magnitude (z = 2.544, p = 0.011) and exceeds social support (z = 3.747, p < 0.001), while self-esteem and social support do not differ from each other (z = −1.648, p = 0.099). The bivariate ordering therefore anticipates the multivariable one.

Table 4. Spearman rank correlations with quality of life, formal contrasts between them, and the ceiling each association would face under three-level categorisation (n = 102).

Association with quality of life	ρ	95% CI	ρ^2 (%)	p	Ceiling on |ρ| if both variables categorised
Perceived stigma	−0.720	−0.811 to −0.596	51.8	< 0.001	0.265
Perceived social support	0.345	0.156 to 0.510	11.9	< 0.001	0.650
Self-esteem	0.521	0.352 to 0.657	27.1	< 0.001	0.748
Contrast: |ρ| stigma − ρ self-esteem	—	—	—	**0.011**	z = 2.544
Contrast: |ρ| stigma − ρ social support	—	—	—	**< 0.001**	z = 3.747
Contrast: ρ social support − ρ self-esteem	—	—	—	0.099	z = −1.648

Confidence intervals use the Bonett–Wright standard error for Spearman's ρ, $\sqrt{[(1 + \rho^2/2)/(n - 3)]}$.

3.5. Regression assumptions

Multicollinearity was acceptable. The tolerance values are 0.846 for stigma, 0.921 for perceived social support and 0.806 for self-esteem, with variance inflation factors 1.182, 1.086 and 1.241 — far inside the conventional tolerance > 0.10 and VIF < 10 limits. The Glejser test showed no evidence of heteroscedasticity: regressing the absolute residuals gave t = −0.649 (p = 0.518) for stigma, t = 1.624 (p = 0.108) for social support and t = 1.831 (p = 0.070) for self-esteem. Both diagnostics have low power at this sample size and are reported as weak evidence.

3.6. Multivariable model

The fitted model is detailed in **Table 5** and displayed in **Figure 3**. The three variables jointly explained 80.6% of the variance in quality of life (R^2 = 0.806, 95% CI 0.731–0.844; adjusted R^2 = 0.800; F(3, 98) = 135.347, p < 0.001; Cohen's f^2 = 4.14, 95% CI 2.72–5.41). Every predictor retained an independent association. Stigma was negatively associated with quality of life, β = −0.766 (95% CI −0.862 to −0.670), t(98) = −15.818, p < 0.001, partial r = −0.848 (−0.895 to −0.781), local f^2 = 2.55 (1.95 to 3.23). Self-esteem was positively associated, β = 0.229 (0.131 to 0.327), t(98) = 4.616, p < 0.001, partial r = 0.423 (0.247 to 0.572), f^2 = 0.22 (0.07 to 0.45). Perceived social support was positively associated, β = 0.201

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(0.109 to 0.293), t(98) = 4.331, p < 0.001, partial r = 0.401 (0.222 to 0.554), f^2 = 0.19 (0.06 to 0.41). Expressed as Cohen's d, the three partial correlations become −3.20, 0.93 and 0.88; these are re-expressions of continuous-variable partial correlations, not differences between groups.

Table 5. Multiple linear regression of quality of life on the three psychosocial variables (n = 102).

Predictor	B	β	95% CI for β	t(98)	p	sr^2 % (95% CI)	Partial r (95% CI)	Local f^2 (95% CI)	Cohen's d (95% CI)	VIF
(Constant)	328.046	—	—	8.456	< 0.001	—	—	—	—	—
Perceived stigma	−4.648	−0.766	−0.862 to −0.670	−15.818	< 0.001	49.6 (38.0–62.9)	−0.848 (−0.895 to −0.781)	2.55 (1.95 to 3.23)	−3.20 (−4.01 to −2.50)	1.182
Perceived social support	32.678	0.201	0.109 to 0.293	4.331	< 0.001	3.7 (1.1–7.9)	0.401 (0.222 to 0.554)	0.19 (0.06 to 0.41)	0.88 (0.46 to 1.33)	1.086
Self-esteem	1.495	0.229	0.131 to 0.327	4.616	< 0.001	4.2 (1.4–8.6)	0.423 (0.247 to 0.572)	0.22 (0.07 to 0.45)	0.93 (0.51 to 1.39)	1.241

Model: R^2 = 0.806 (95% CI 0.731 to 0.844); adjusted R^2 = 0.800; F(3, 98) = 135.347, p < 0.001, i.e. 80.6% of the variance; Cohen's f^2 = 4.14 (95% CI 2.72 to 5.41). Unique variance sums to 57.5%; 23.1% of the explained variance is not uniquely attributable to any single predictor and 19.4% is unexplained.

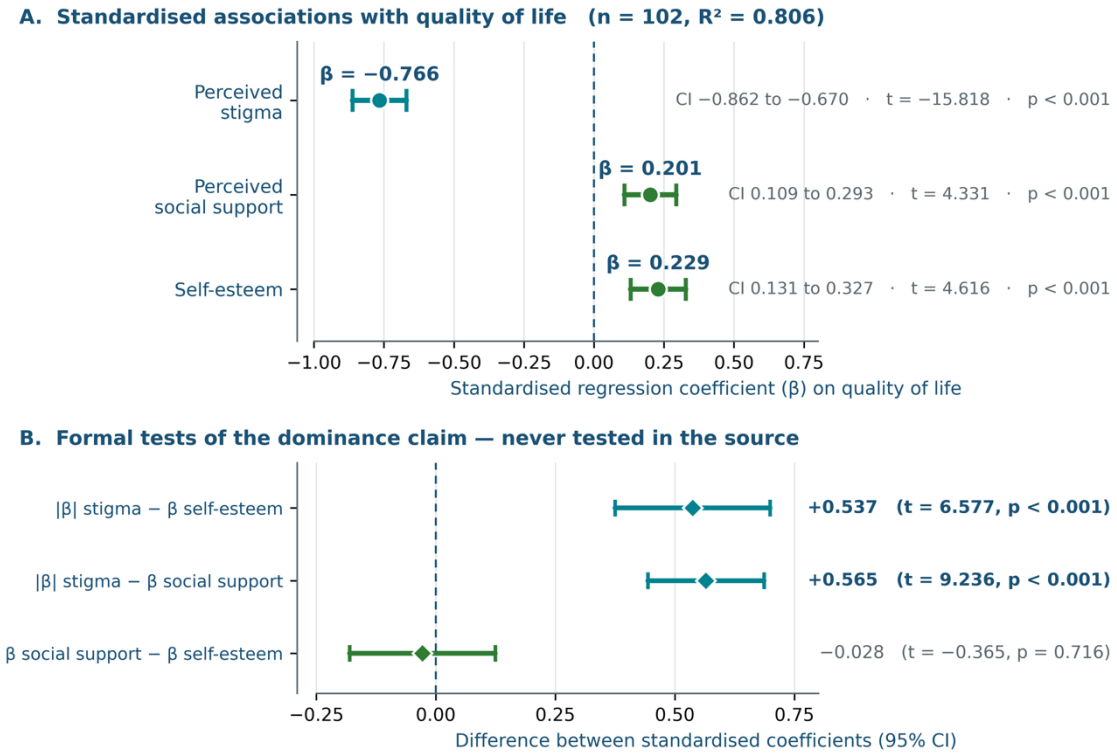

Figure 3. Primary outcome. (A) Standardised regression coefficients with 95% confidence intervals for the association of each variable with quality of life. (B) The three formal contrasts between those coefficients. Perceived stigma outranks both contextual stimuli; the two contextual stimuli cannot be distinguished from each other.

The unstandardised coefficients are reported in **Table 5** for completeness and are not interpreted in score points anywhere in this article. The source gives no mean or standard deviation for any total score, states two different scoring rules for the quality-of-life instrument, and does not describe the transformation its cut-points imply. A coherence check confirms that the metric is not merely unstated but internally contradictory: fitting a normal latent to each predictor's own category margins and combining it with that predictor's B and β implies a standard deviation for the quality-of-life score of 34.1 by way of self-esteem and 153.7 by way of social support, a factor of 4.51 apart on a scale whose printed cut-points run to 100. At least one printed B, or the metric in which the MSPSS entered the model, is not what the instrument section describes.

The variance decomposition is displayed in **Figure 4A**. Stigma alone accounted uniquely for 49.6% of the variance in quality of life (95% CI 38.0–62.9), against 4.2% for self-esteem (1.4–8.6) and 3.7% for perceived social support (1.1–7.9); 23.1% of the explained variance is not uniquely attributable to any single predictor and 19.4% is unexplained. The not-uniquely-attributable share is an arithmetic residual, not a commonality component, and is labelled accordingly. The partial correlation for stigma (−0.848) and the zero-order Pearson correlation implied by the recovered matrix (−0.834) are effectively equal, so there is no evidence of suppression; an earlier draft of this analysis

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inferred suppression by comparing the partial Pearson coefficient with the zero-order **Spearman** coefficient, which are different estimators on different scales, and that claim has been withdrawn.

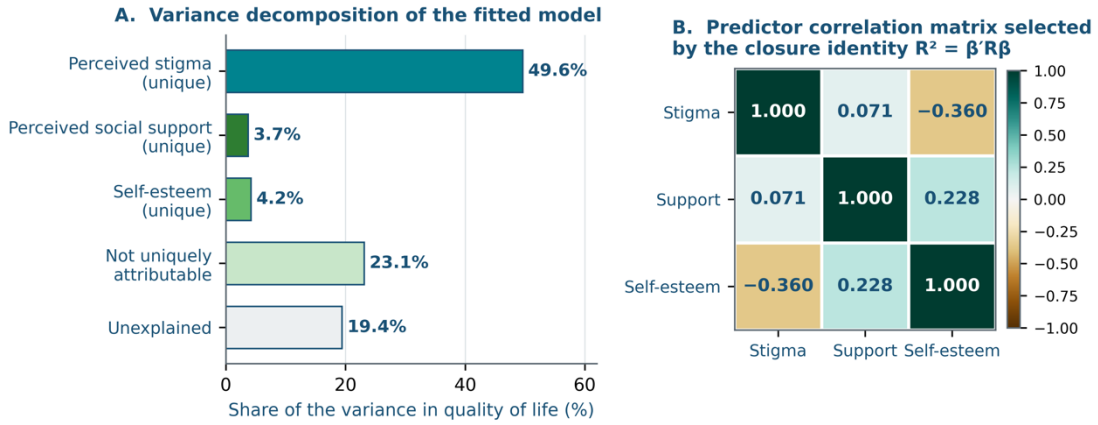

Figure 4. (A) Decomposition of the variance in quality of life into the unique contribution of each variable, the share not uniquely attributable to any one of them, and the unexplained remainder. (B) The predictor correlation matrix, selected from the sixteen configurations the reported tolerances admit by the identity $R^2 = \beta'R\beta$, which supplies the covariance needed for the contrasts in **Figure 3B**. The correlation between stigma and perceived social support is within rounding of zero, so its sign carries no weight.

3.7. Recovering the covariance of the standardised coefficients

The predictor correlation matrix underlying those standard errors was recovered from the collinearity diagnostics; the selected matrix is displayed in **Figure 4B**. The three tolerances admit 8 positive-definite matrices for each tolerance vector, in two magnitude roots and four sign patterns each, so the tolerances alone do not identify the matrix. Imposing the identity $R^2 = \boldsymbol{\beta'R\beta}$, which any standardised least-squares fit must satisfy, reduces the 16 configurations admitted by the two tolerance vectors to 2; requiring only that the two psychosocial resources be positively correlated with each other selects exactly one. Under that matrix, stigma correlates −0.360 with self-esteem and 0.071 with perceived social support — the latter within rounding of zero, so its sign carries no weight — while the two resources correlate 0.228 with each other, and the closure gap is 0.0007. Every configuration built on the tolerance implied by the printed coefficient and t statistic for stigma, rather than on the printed tolerance, fails the closure test.

That selection localises the source record's remaining inconsistency. Under the selected matrix the printed β and the printed tolerance for stigma imply t(98) = −15.818, whereas the source prints −15.186; for perceived social support and self-esteem the printed and implied t statistics agree exactly (4.331 and 4.616), which is itself a check on the recovery. The single printed t statistic for stigma is therefore the quantity that cannot stand, and the results below use the value implied by the closure-consistent system. The audit at the end of this section records it.

3.8. Formal test of the ranking

The contrasts that decide the study's practical question are detailed in **Table 6** and displayed in panel B of **Figure 3**. The absolute standardised effect of stigma exceeded that of self-esteem by 0.537 (95% CI 0.375–0.699; t(98) = 6.577, p < 0.001) and that of perceived social support by 0.565 (0.444–0.686; t(98) = 9.236, p < 0.001). The two contextual stimuli did not differ from each other: −0.028 (−0.180 to 0.124; t(98) = −0.365, p = 0.716). That interval is wide enough to admit a difference as large as the whole social-support coefficient, so the correct reading is that the data cannot distinguish the two resources, not that they are equal.

Table 6. Formal contrasts between the standardised regression coefficients — the tests on which the ranking rests.

Contrast	Difference	SE	95% CI	t	df	p	p (alternative tolerance)	p (self-consistent model)
|β| perceived stigma − β self-esteem	0.537	0.082	0.375 to 0.699	6.577	98	< 0.001	< 0.001	< 0.001
|β| perceived stigma − β perceived social support	0.565	0.061	0.444 to 0.686	9.236	98	< 0.001	< 0.001	< 0.001
β perceived social support − β self-esteem	−0.028	0.077	−0.180 to 0.124	−0.365	98	0.716	0.695	0.716

Contrasts use $\mathrm{Cov}(\beta) = c \cdot \mathbf{R}^{-1}$ with $c = (1 - R^2)/(n - k - 1)$ and **R** the predictor correlation matrix of **Figure 4B**. The hypothesis tested is linear ($\beta_{stigma} + \beta_j = 0$), which coincides with the comparison of magnitudes because the stigma coefficient is unambiguously negative.

Because the standard deviations used in standardising are estimated rather than known, the standard errors are an approximation. A 20,000-replication Monte Carlo at this sample size and R^2 gives a contrast standard error about 5% smaller than the true sampling variability, so these p values are mildly anti-conservative; at the magnitudes reported the correction changes nothing.

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Because the recovered matrix rests on a selection rather than a unique inversion, both contrasts were repeated under every one of the 16 admissible configurations, including the ones the closure test rejects, and under each of the three ways of resolving the over-determined triple of printed coefficient, t statistic and tolerance for stigma. The stigma-versus-self-esteem contrast ranges over t = 6.34 to 10.07 and the stigma-versus-social-support contrast over t = 7.33 to 9.61; the largest p value either takes across the whole set is 6.95e-09. The contextual contrast remains non-significant throughout (p between 0.630 and 0.716). On the fully self-consistent reconstruction of the model — the R^2 and coefficients that the printed t statistics and tolerances themselves imply, R^2 = 0.795 — the two contrasts are 0.520 and 0.548, essentially unchanged. **Table 7** reports the enumeration.

Table 7. Every correlation matrix the reported collinearity diagnostics admit, with the closure test that selects among them and the two dominance contrasts under each.

Tolerance vector	Closes ?	Resource s r > 0?	r(stigma, support), r(stigma, esteem), r(support, esteem)	β′Rβ	t: stigma vs esteem	p	t: stigma vs support	p	p: support vs esteem
printed (0.846)		√	0.169, 0.387, 0.273	0.517	9.678	6.06e-16	8.739	6.56e-14	0.711
printed (0.846)			0.169, −0.387, −0.273	0.738	6.643	1.73e-09	8.739	6.56e-14	0.640
printed (0.846)			−0.169, 0.387, −0.273	0.571	9.678	6.06e-16	8.139	1.28e-12	0.640
printed (0.846)		√	−0.169, −0.387, 0.273	0.892	6.643	1.73e-09	8.139	1.28e-12	0.711
printed (0.846)			0.071, 0.360, −0.228	0.511	9.891	2.08e-16	9.236	5.50e-15	0.630
printed (0.846)	√	√	0.071, −0.360, 0.228	0.805	6.577	2.35e-09	9.236	5.50e-15	0.716
printed (0.846)		√	−0.071, 0.360, 0.228	0.596	9.891	2.08e-16	7.793	7.00e-12	0.716
printed (0.846)	√		−0.071, −0.360, −0.228	0.807	6.577	2.35e-09	7.793	7.00e-12	0.630
implied (0.779)		√	0.265, 0.432, 0.198	0.465	9.809	3.15e-16	9.230	5.67e-15	0.695
implied (0.779)			0.265, −0.432, −0.198	0.731	6.412	5.06e-09	9.230	5.67e-15	0.666
implied (0.779)			−0.265, 0.432, −0.198	0.592	9.809	3.15e-16	7.518	2.67e-11	0.666
implied (0.779)		√	−0.265, −0.432, 0.198	0.931	6.412	5.06e-09	7.518	2.67e-11	0.695
implied (0.779)			0.203, 0.401, −0.096	0.467	10.069	8.57e-17	9.611	8.46e-16	0.646
implied (0.779)		√	0.203, −0.401, 0.096	0.767	6.344	6.95e-09	9.611	8.46e-16	0.707
implied (0.779)		√	−0.203, 0.401, 0.096	0.610	10.069	8.57e-17	7.331	6.58e-11	0.707
implied (0.779)			−0.203, −0.401, −0.096	0.874	6.344	6.95e-09	7.331	6.58e-11	0.646

The three tolerance values fix the three correlation magnitudes only up to two roots and leave the sign pattern free except for the sign of the product $r_{12}r_{13}r_{23}$, giving 8 admissible positive-definite matrices per tolerance vector and 16 configurations in all. A multi-start global solve of the full three-equation system recovers exactly this set and nothing outside it.

The 'Closes?' column applies the identity $R^2 = \boldsymbol{\beta' R \beta}$, which any standardised least-squares fit satisfies. 2 of the 16 configurations satisfy it; requiring in addition that the two psychosocial resources be positively correlated with each other leaves exactly one, which is the matrix used throughout this article (closure gap 0.0007). Note that r(stigma, perceived social support) is within rounding of zero in that matrix, so its sign carries no substantive weight.

Both dominance contrasts are significant in every configuration, including those the closure test rejects, and the contextual contrast is non-significant in every one. The ranking is therefore not an artefact of the selection.

One property of the test itself should be stated plainly. Treating the standard deviations used in standardising as known constants makes the reported standard errors an approximation. A Monte Carlo of 20,000 replications at n = 102 and this R^2, drawing from the recovered matrix, gives a standard error for the stigma coefficient about 14% larger than the true sampling variability (so its interval is conservative) and a standard error for the contrast about 5% smaller (so the contrast p values are mildly anti-conservative). At p values of the order reported here the correction changes nothing, but the direction is stated so that readers can judge it. In standardised terms, offsetting one standard deviation of stigma would correspond to 3.81 standard deviations of perceived social support (Fieller 95% CI 2.65–7.00) or 3.34 standard deviations of self-esteem (2.10–6.12). This is a ratio of cross-sectional associations and is not an intervention exchange rate.

3.9. Measurement and detection limits

Table 4 also carries a measurement result that matters for programme monitoring. If the three-level categories of **Table 2** were correlated with quality of life in place of the continuous total scores, the largest coefficient attainable for stigma given its own 6 / 96 category margin would be 0.265 — far below the 0.720 reported. The reported coefficients must therefore have been computed on the continuous scores, which is the correct choice, and which also contradicts the source's own operational-definition table, where all four variables are declared ordinal and coded 1 to 3. The consequence for practice is the important part. If a programme collapsed only the exposure and left quality of life continuous — the configuration monitoring would actually use — the ceiling would be 0.408, so categorised monitoring would discard 43.3% of the association on the ρ scale and 67.9% on the shared-variance scale. This comparison is shown in **Figure 5**.

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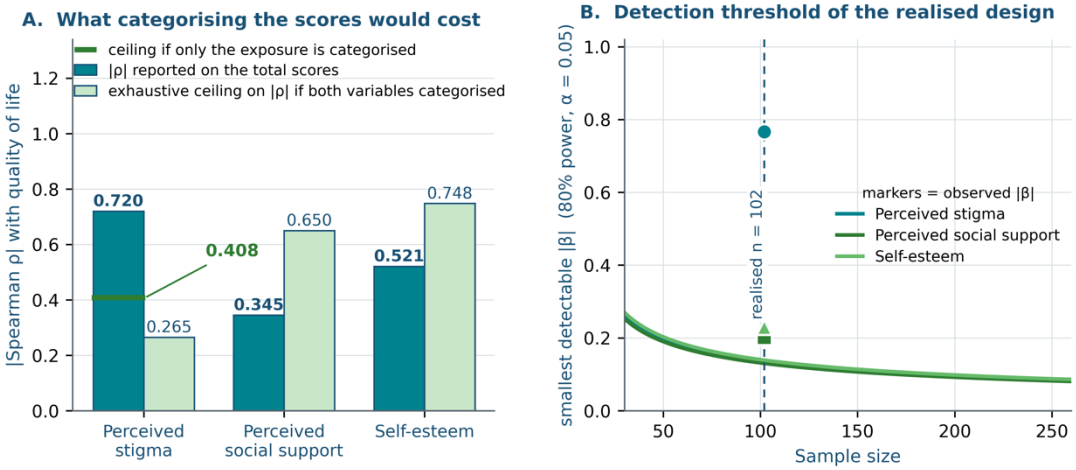

Figure 5. (A) The measurement penalty of categorising the stigma score. The reported rank correlation exceeds the ceiling that the score's own category margin would impose, which shows the coefficient is on the continuous score and that categorised monitoring would discard most of the signal; the ceilings shown are exhaustive maxima over all tables with the printed margins, not comonotone approximations. (B) The smallest standardised coefficient detectable at 80% power as a function of sample size, with the realised design and the three observed coefficients marked. At n = 102 the thresholds are |β| = 0.136 for perceived stigma, 0.130 for perceived social support and 0.139 for self-esteem, corresponding to a squared semipartial correlation of 0.0156 inside a model of this R^2; the smallest detectable Spearman correlation is ρ = 0.279. All three observed coefficients exceed their own thresholds.

The detection threshold of the realised design is displayed in **Figure 5B**. At n = 102, α = 0.05 and 80% power, the smallest standardised coefficient detectable was |β| = 0.136 for stigma, 0.130 for perceived social support and 0.139 for self-esteem, corresponding to a squared semipartial correlation of 0.0156 inside a model of this R^2; the smallest detectable Spearman correlation was ρ = 0.279. All three observed standardised coefficients and all three observed rank correlations exceed their own thresholds, so no association reported here sits below its detection limit. These are between-person thresholds for a cross-sectional regression and do not transfer to a pre-post evaluation, whose power depends on a within-person correlation that these data cannot estimate. Observed power was not computed.

4. Discussion

This community diagnosis of 102 people receiving treatment for pulmonary tuberculosis at RSUD Ulin Banjarmasin found that perceived stigma, social support and self-esteem together account for 80.6% of the variance in quality of life, and that stigma is not merely one determinant among three but the largest by a margin that survives a formal statistical test and every reconstruction the reported statistics admit. Severe stigma was close to universal — 94.1% (95% CI 87.8–97.3) of participants, with not one person in the mild band — while social support and self-esteem sat mostly at moderate levels. In Roy's terms the focal stimulus is both nearly ubiquitous and by far the heaviest, and the contextual stimuli that should buffer it are themselves only middling. That is an actionable community profile, and it points a nurse-led empowerment programme outward, toward the neighbourhood, rather than inward toward the individual patient.

Two qualifications must travel with that sentence, because the instrument constrains what may be inferred from it. The scale is completed by the patient, and twelve of its twenty-eight items concern self-stigma, so what was measured is stigma as the patient perceives and has internalised it. The source's own conclusion uses exactly this language (*stigma masyarakat yang dirasakan*, perceived stigma). Nothing in this study measures what community members believe or do, and no community-level variable was recorded. The programme logic below is therefore an inference from patient perception to a community target, not a measurement of the community; and the community-perspective form of the same instrument, which exists[40], would have to be added before the inference could be checked. The second qualification is that 94.1% (95% CI 87.8–97.3) in a single band leaves the categorised variable with almost no variance, so this sample can say nothing about the shape of the stigma–quality-of-life relationship outside the severe band.

The prevalence of severe stigma found here is high by comparison with published Indonesian series, although the comparison cannot be made formally: the multi-site cross-sectional study of Fuady and colleagues reports substantial but not near-universal stigma alongside depression and impaired quality of life[5], and a later study of multidrug-resistant tuberculosis reports stigma degrading quality of life across domains[6], but neither uses this instrument's cut-points, so no proportion in those papers is commensurable with the 94.1% reported here and no test of the difference is possible. Two features of this setting are plausible contributors, offered as hypotheses rather than findings. This is a class A referral hospital, so its patients are on average further into a longer and more visible illness course, and visibility is the mechanism through which labelling becomes discrimination[19,40]. Educational attainment in

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this sample was low, and community-level knowledge deficits are among the most consistently reported drivers of tuberculosis stigma in high-burden settings[19,20,22], with reviews of the determinants of social and self-stigma placing knowledge and visibility at the head of the list[40]. The comparison also has to reckon with the psychiatric burden that travels alongside: depression and anxiety are common in tuberculosis cohorts and are themselves associated with worse treatment outcomes, so a stigma prevalence this high is unlikely to be an isolated finding[45,46]. A third possibility is arithmetical rather than social: if the scale's four positively worded items were not reverse-scored, the ceiling is partly an artefact, and the source does not record the scoring rule for them. The finding should not be read as evidence that Banjarmasin is more stigmatising than other Indonesian cities; it should be read as evidence that the referral population is the most stigma-exposed segment of the local patient pathway.

The magnitude of the stigma effect is the study's most transportable result and also the one most in need of caution. The partial correlation of −0.848 (−0.895 to −0.781) is larger than the associations reported for single psychosocial predictors of quality of life in comparable work: Chinese cross-sectional data linking experienced stigma, distress and quality of life, and the moderating role of self-esteem, report associations in the moderate range[23,24]; systematic reviews describe stigma as an important but not overwhelming correlate[10,28]; and Indian and Chinese series report quality-of-life differences across treatment phase and resistance status of similar or smaller magnitude[11,30]. None of these comparisons is a test, because the designs and instruments differ. Three considerations temper the estimate itself. It is a partial correlation estimated with two correlated covariates in the model. Both constructs were reported by the same respondent at the same sitting, so common-method variance is expected to inflate it. And, more specifically than that, twelve self-stigma items and several items of the WHOQOL psychological and social domains address overlapping experience, so criterion contamination is a more likely explanation for an R^2 of 0.806 between four self-report psychosocial scales than three independent causal channels are. The defensible reading is that stigma is the largest of the three effects by a wide and tested margin, not that its absolute magnitude is an unbiased population value.

The contrast test is what separates this study from the descriptive correlational literature it belongs to. It is common in Indonesian nursing research to identify the dominant determinant by reading standardised coefficients side by side and declaring the largest one dominant, and the source thesis does exactly that. The practice ignores the sampling covariance between the coefficients, which is neither zero nor negligible when the predictors are correlated, and it is precisely what the relative-importance literature warns against: the difference between two standardised coefficients is itself an estimate with a standard error, and comparing two point estimates by eye is not a test of it[35]. Reviews that pool determinants of quality of life in tuberculosis rank them by magnitude across studies without testing any such difference[10,28]. Here the difference was computed. Stigma exceeded self-esteem by 0.537 standardised units and social support by 0.565 (both $p < 0.001$), and the ranking held in all 16 admissible reconstructions and under all three resolutions of the source's over-determined stigma triple. Equally important, the two contextual stimuli did *not* differ from one another ($p = 0.716$), and the interval is wide enough that the data simply cannot separate them; the apparent ranking of self-esteem above social support in the coefficient table is not a finding and must not be used to allocate resources between them.

The identification argument deserves the same scepticism the paper applies elsewhere. Three tolerance values do not invert to a unique correlation matrix; they fix three magnitudes up to two roots and leave the sign pattern free except for one product, giving 8 admissible matrices per tolerance vector. What made the recovery usable was not an assumption about the signs but a constraint the data must satisfy: for standardised least squares, R^2 equals $\boldsymbol{\beta}'\mathbf{R}\boldsymbol{\beta}$, and only two of the sixteen configurations satisfy it. That constraint also did diagnostic work the audit had not done — it showed that the printed tolerance for stigma is the value the system supports and the printed t statistic is not, which is the reverse of what an earlier draft of this analysis concluded. The general lesson is worth stating for the literature this paper is addressed to: a published regression table carries more constraints than it appears to, and those constraints can be used both to test the comparisons the authors made informally and to find errors in the table itself.

These results align with the Roy Adaptation Model and also expose a difficulty in how it is usually applied. Roy's framework predicts that the focal stimulus dominates the adaptive response and that contextual stimuli modulate rather than replace it[14], and the variance decomposition in **Figure 4A** shows that pattern. But two of the three predictors are not, in Roy's own scheme, stimuli at all: self-esteem belongs to the self-concept mode and perceived social support to the interdependence mode, and both are therefore adaptive outputs alongside quality of life rather than inputs to it. Treating them as contextual stimuli, as the source does and as this article follows in order to report the model that was fitted, means the regression may be conditioning on mediators: if self-esteem lies downstream of stigma — which is what the Indonesian evidence on self-esteem in tuberculosis suggests[24,32,47] — then the stigma coefficient is not the total association a programme would move, and it is not identified as anything else by these data. Age, sex, education and illness duration are also treated as residual stimuli in **Figure 1** although they were measured, which is a departure from Roy's definition; they are shown as measured but unmodelled, and no confounder adjustment was possible. The theoretical contribution this study can honestly claim is narrower than a test of Roy's model and more useful than a restatement of it: the

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model does not say which stimulus is focal, the assignment is made by the researcher, and a contrast test converts that assignment into an empirical claim. It is consistent with the biopsychosocial position that the social response to illness is a causal input to health[15] and with psychoneuroimmunological accounts of how supportive relationships translate into physiological benefit[48]. The self-esteem construct is carried here by the instrument whose structure has been validated in an Indonesian clinical sample, which is the limit of what can be claimed for its cultural transportability[43].

Table 8 turns the ranking into an empowerment specification, and it is a design rather than a tested programme. Because stigma is experienced in the neighbourhood even though it was measured in the patient, the specification places three community-facing components first. *Kader*-delivered neighbourhood education, run through the *Puskesmas* tuberculosis programme and the PMO cadre in the *kelurahan* patients return to, addresses the knowledge deficits that drive labelling[13,49]; contact-based and community-based education programmes have reduced tuberculosis stigma and improved preventive-treatment uptake in comparable settings[50,51], and Indonesian work on tuberculosis-alert health cadres and on community empowerment for service integration shows the delivery model is already in the system[52,53]. What that literature also shows is that the cadre is not free labour: Indonesian community health workers have measurable employment preferences and their knowledge and practice track the social capital of the village they work in[54,55]. The *Posyandu* and *Posbindu* platforms are named as possible venues under the integrated primary-service restructuring rather than as the natural home of adult tuberculosis work, which they are not. Family psychoeducation, delivered before discharge and reinforced at DOTS visits, addresses the household as the first site of separation and status loss[31,32]. A tuberculosis survivor peer-education group, convened through the hospital's Hospital Health Promotion unit, supplies the credible in-group messenger that stigma-reduction interventions require[21,22], and resilience, self-care and spiritual resources are the material such groups work with in this population[15,30]. **That component carries a real risk and the specification carries the safeguards to match**: in a catchment where almost every patient reports severe stigma, recruiting facilitators from discharged patients asks them to disclose publicly in the environment that stigmatised them, so **Table 8** requires a separate facilitator consent process, confidentiality protection, supervision and debriefing, transport support, and a defined exit route. A second dividend is expected on the clinical side, because perceived and internalised stigma are repeatedly associated with poorer medication adherence[56–59], and psychosocial support interventions have improved treatment outcomes in comparable programmes[60], so a programme that lowers stigma also protects treatment completion.

Table 8. Empowerment programme specification derived from the tested ranking, with measurable targets, safeguards and sustainability anchors.

Priority	Component	Delivery agent and setting	Measurable target	Monitoring source and denominator	Sustainability anchor and safeguards
1	Neighbourhood tuberculosis literacy and anti-labelling education	Kader and PMO cadre supervised by the Puskesmas tuberculosis programme, in the patients' kelurahan; Posyandu and Posbindu sessions used as venues where the integrated primary-service restructuring makes that appropriate	Reduction of at least 0.5 standardised units (Cohen's d ≥ 0.5) in the mean continuous stigma score over one programme cycle	Continuous stigma score at the DOTS visit, **never the three-level category**; denominator = all patients registered at baseline, with non-attenders counted as missing rather than dropped	Kader activity is eligible for Bantuan Operasional Kesehatan and district budget support subject to annual Puskesmas planning; it is not a standing line item and must be budgeted each year
1	Family psychoeducation before discharge and at DOTS visits	Ward nurses at the Paru Center, reinforced by DOTS clinic nurses	≥ 80% of households of patients newly registered at the ward receive one structured session; MSPSS family subscale measured before and after	Nursing care record; MSPSS family subscale; denominator = ward registrations in the period	Integrated into the existing discharge-planning workflow; requires a defined nursing time allocation, which is a service decision and not assumed here
1	Tuberculosis survivor peer-education group	Promosi Kesehatan Rumah Sakit unit, RSUD Ulin Banjarmasin, with trained survivor facilitators	One group cycle per quarter; ≥ 60% attendance among invited patients; stigma and quality-of-life scores at entry and exit	Group register; continuous stigma and quality-of-life scores; denominator = patients invited, not patients attending	**Facilitator safeguards are mandatory**: separate written consent for public disclosure of tuberculosis status, confidentiality protection, named supervision and debriefing, transport support, and a defined exit route for any facilitator who experiences harm. Without these the

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Priority	Component	Delivery agent and setting	Measurable target	Monitoring source and denominator	Sustainability anchor and safeguards
					component must not be run
2	Individual self-esteem counselling (cognitive-behavioural approach)	Ward and clinic nurses with counselling preparation, in a dedicated counselling space	Rosenberg self-esteem score at entry and exit; every patient in the low band offered referral	Rosenberg self-esteem score; denominator = patients screened	Delivered inside outpatient episodes already paid through the INA-CBG packages of BPJS Kesehatan, which does not reimburse nurse counselling as a separate claim
2	Social-support mobilisation for patients discharged without a household carer	Ward nurses with kader linkage back to the kelurahan	Carer status recorded at discharge; MSPSS total at entry and exit; no patient discharged without a named community contact where no household carer exists	Discharge checklist (carer status) and MSPSS total; denominator = all discharges	Kader linkage recorded in the Puskesmas register; note that MSPSS measures perceived support and is not by itself an indicator of an absent carer, which is why carer status is recorded separately
Cross-cutting	Depression screening and referral	Ward and clinic nurses; referral to the Puskesmas mental-health service or the provincial psychiatric hospital	Validated Indonesian depression screen (for example the PHQ-9) administered with the psychosocial battery; every positive screen referred and the referral closed in the record	Screening instrument score and referral log; denominator = all patients screened	Stigma travels with depression in this population, and a low self-esteem band is not a clinical screen; this component exists because the ranking alone does not supply a safety net
—	Programme evaluation	Postgraduate nursing programme, Universitas Muhammadiyah Banjarmasin, with the hospital	A pre-post or controlled design sized on a standardised mean difference, not on the between-person threshold of $\|\beta\| \geq 0.136$ reported here, which does not transfer to a repeated-measures design	Full instrument battery, repeated, with in-sample reliability computed on the first wave	Embedded in the master's programme's annual research cycle

Priority 1 components address the stimulus the contrast test ranked first; priority 2 components address the two contextual stimuli, which are given **equal** priority because the data cannot distinguish them (p = 0.716, 95% CI −0.180 to 0.124) — not because they have been shown to be equal.

Individual counselling to raise self-esteem, for which supportive-educative nursing intervention in tuberculosis and Indonesian evidence that family support and self-esteem together carry resilience in this population give the starting point[61,62], is retained but ranked second, on the evidence of the contrast test rather than on preference. Support mobilisation for patients discharged without a household carer sits alongside it at the same rank, since family and close-relationship support is the component most consistently linked to quality of life and psychological well-being[48,63,64], and because the two contextual stimuli could not be separated statistically. The specification also adds what the ranking alone does not supply: a validated depression screen with a named referral pathway, because stigma travels with depression in this population and the study's only referral trigger would otherwise be a low self-esteem band that is not a clinical screen[5,64]. Sustainability rests on three anchors, stated in the terms the Indonesian system actually uses rather than as standing entitlements: kader activity is eligible for *Bantuan Operasional Kesehatan* and district budget support subject to annual *Puskesmas* planning, and is not a funded line item; the clinical contacts are delivered inside outpatient episodes already paid through the INA-CBG packages of BPJS Kesehatan, which does not reimburse nurse counselling as a separate claim; and recording the psychosocial score at the DOTS visit requires a field the national tuberculosis information system does not have, so a local register is proposed and the change to the national instrument is named as a decision for the district and provincial programme rather than the hospital.

One measurement finding has direct operational consequence. **Figure 5A** shows that collapsing the stigma score into the three categories used for descriptive reporting would cap the attainable correlation with a categorised quality-of-life outcome at 0.265, and at 0.408 even if the outcome were left continuous, because 94.1% (95% CI 87.8–97.3) of the sample falls in a single band. A programme evaluating itself on the proportion of patients in the severe band would be structurally unable to detect the improvement it produced until enough people crossed a cut-point, which is a monitoring design that guarantees a null. The indicator must be the continuous score. The same figure gives the programme its power budget, with one warning: the realised design could detect $|\beta|$ down to 0.136 between persons at one moment, and that threshold does not transfer to a pre-post evaluation, which would have to be sized on a standardised mean difference and on a within-person correlation these data cannot estimate. There is a second monitoring trap in the same place: if the indicator is collected at DOTS visits, patients who disengage leave the denominator, and

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disengagement is itself associated with stigma, so the measured score will improve as the most stigmatised patients stop attending. Loss to follow-up in tuberculosis programmes is predictable enough that risk scores for it have been developed and internally validated, and nutritional status and digital adherence support both change who remains in view[65–67]; a monitoring plan that ignores this will mistake attrition for improvement. **Table 8** therefore attaches a retention denominator to every row.

The study has three strengths. It samples the provincial referral funnel, so it describes the segment of the tuberculosis population any South Kalimantan programme will meet first; every comparative claim it makes has been tested rather than asserted, with the covariance required for that test selected by an algebraic constraint rather than assumed and checked across every admissible alternative; and it audits and publishes the inconsistencies of its own source record instead of choosing silently among them. Six limitations must be set against them. First, the design is cross-sectional, so no causal direction can be established; low quality of life may raise perceived stigma as readily as the reverse, and the two directions are observationally equivalent here. Second, recruitment was non-probability, so neither a response fraction nor a recruitment period can be reported, and people too unwell to participate — plausibly those with the worst quality of life — are absent by design, which truncates the outcome distribution in a direction that cannot be signed without the screening counts. Third, no internal-consistency coefficient was computed in this sample and none is available at all for the self-esteem measure; because the less reliable instrument is attenuated more, and the stigma scale is the one with the lowest published coefficient, the ranking is if anything conservative, but its magnitudes cannot be corrected. Fourth, all four constructs were self-reported by the same respondent at one sitting, with item-content overlap between the stigma and quality-of-life instruments, and no clinical covariate — sputum conversion, treatment phase, drug resistance, comorbidity — was available; the one clinical variable present, illness duration, could not be entered into the model or cross-tabulated, although a Discussion argument above appeals to it. Fifth, the unstandardised coefficients cannot be interpreted, for the reasons given in the Results, and the model fitted was not the one the source's analysis plan pre-specified, which makes it exploratory with respect to that plan. Sixth, this is a single-site referral sample with no primary-care or community comparison, so the specification in **Table 8** is a proposal for this catchment and a hypothesis for the province, not a provincial recommendation.

5. Conclusion

Perceived tuberculosis stigma, social support and self-esteem jointly explained 80.6% of the variance in quality of life among 102 people treated at Ulin Regional General Hospital, Banjarmasin, and stigma outranked both resources by a tested margin — 0.537 standardised units over self-esteem and 0.565 over social support, both $p < 0.001$ and stable across every admissible reconstruction (partial r for stigma −0.848). Nurse-led empowerment in this catchment should lead with community-facing stigma reduction through *kader*, family psychoeducation and survivor peer educators, sustained by *Puskesmas* supervision, a local psychosocial record at the DOTS visit and care inside existing BPJS-funded contacts, and should monitor the continuous score rather than its categories. Whether the ranking holds outside this referral hospital is a question for a multi-site study.

6. Declarations

6.1. Statement on the Use of Artificial Intelligence

No generative artificial-intelligence tool was used at any stage of this work, including the design of the study, the analysis and re-derivation of the data, and the writing and revision of the manuscript. The authors are solely responsible for the whole of the content presented here.

6.2. Author Contribution Statement

DAP conceived the study, collected the data and drafted the manuscript. YA supervised the design and the theoretical framing. H supervised the community-nursing components and the empowerment specification. S contributed to the instrument selection and to the medical–surgical nursing interpretation. All authors read and approved the final manuscript.

6.3. Funding Statement

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

6.4. Conflict of Interest

The authors declare that they have no competing interests.

6.5. Data Availability Statement

The de-identified dataset and the analysis scripts supporting the findings are available from the corresponding author on reasonable request.

6.6. Ethics Approval and Consent to Participate

Approved by the Health Research Ethics Committee of Universitas Muhammadiyah Banjarmasin (129/UMB/KE/IV/2026) and by the Research Ethics Committee of Ulin Regional General Hospital Banjarmasin (73/V-Reg Riset/RSUDU/2026). Written informed consent was obtained from all participants. The study was conducted in accordance with the Declaration of Helsinki.

6.7. Consent for Publication

Not applicable. The article reports aggregate data only, and no individually identifiable participant information, image or case detail is presented.

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7. References

1. Awad SF, Critchley JA, Abu-Raddad LJ. Impact of diabetes mellitus on tuberculosis epidemiology in Indonesia: A mathematical modeling analysis. Tuberculosis. 2022;134: 102164. doi: 10.1016/j.tube.2022.102164.
2. Pratiwi AB, Setiyaningsih H, Kok MO, et al. Is Indonesia achieving universal health coverage? Secondary analysis of national data on insurance coverage, health spending and service availability. BMJ Open. 2021;11(10): e050565. doi: 10.1136/bmjopen-2021-050565.
3. Rosadi D, Agustina N, Haji Darise Lasari H, et al. Spatio-temporal analysis of pulmonary tuberculosis in Astambul District, South Kalimantan, Indonesia 2020-2021. International Journal of Public Health Science (IJPHS). 2024;13(4): 1589. doi: 10.11591/ijphs.v13i4.23057.
4. Fitriangga A, Alex A, Aryati R. Risk factors for tuberculosis (TB) treatment interruption among new and retreatment TB patients in West Kalimantan Province, Indonesia. Journal of Health Research. 2025;39(5). doi: 10.56808/2586-940x.1159.
5. Fuady A, Arifin B, Yunita F, et al. Stigma, depression, quality of life, and the need for psychosocial support among people with tuberculosis in Indonesia: A multi-site cross-sectional study. PLOS Global Public Health. 2024;4(1): e0002489. doi: 10.1371/journal.pgph.0002489.
6. Arifin B, Sarwadan MG, Wahyudin E, et al. Stigma and health-related quality of life (HRQoL) among people with multidrug-resistant tuberculosis (MDR-TB): A cross-sectional study in Indonesia. Narra J. 2025;5(2): e1317. doi: 10.52225/narra.v5i2.1317.
7. Susanto TD, Widysanto A, Cipta DA, et al. Anxiety and depression level of patients with multidrug-resistant tuberculosis (MDR-TB) in two hospitals in Banten province, Indonesia. Dialogues in Health. 2023;2: 100115. doi: 10.1016/j.dialog.2023.100115.
8. Izhar MD, Butar MB, Hidayati F, et al. Predictors and health-related quality of life with short form-36 for multidrug-resistant tuberculosis patients in Jambi, Indonesia: A case-control study. Clinical Epidemiology and Global Health. 2021;12: 100872. doi: 10.1016/j.cegh.2021.100872.
9. Ausi Y, Yunivita V, Santoso P, et al. A Mixed-Method Study of Medication-Related Burden Among Multi-Drug Resistant Tuberculosis Patients in West Java, Indonesia. ClinicoEconomics and Outcomes Research. 2024;Volume 16: 707-719. doi: 10.2147/ceor.s473768.
10. Quarcoopome L, Tornu E. Health-related quality of life of persons living with tuberculosis: A cross-sectional study. Journal of Clinical Tuberculosis and Other Mycobacterial Diseases. 2022;28: 100324. doi: 10.1016/j.jctube.2022.100324.
11. Wang H, Gu J, Zhang L, et al. Assessing the quality of life in patients with drug-resistant tuberculosis: a cross-sectional study. BMC Pulmonary Medicine. 2024;24(1): 303. doi: 10.1186/s12890-024-03119-1.
12. Khamis KM, Shahar HK, Manaf RA, et al. Effectiveness of education intervention of tuberculosis treatment adherence in Khartoum State: A study protocol for a randomized control trial. PLOS ONE. 2022;17(11): e0277888. doi: 10.1371/journal.pone.0277888.
13. Nompo RS, Hutomo WMP, Setyawardani AD, et al. Deconstructing the Stigma: A Meta-Analysis of Peer-Led and Community-Based Psychosocial Support Interventions on Quality of Life and Stigma Reduction Among Tuberculosis Patients. Open Access Indonesia Journal of Social Sciences. 2026;8(6): 330-344. doi: 10.37275/oaijss.v8i6.312.
14. Candan HD, Doğan S, Güler C, et al. Roy Adaptation Model: Theory-Based Knowledge and Nursing Care With a Person Experiencing COVID-19. Nursing Science Quarterly. 2022;35(3): 304-310. doi: 10.1177/08943184221092434.
15. Pathak VN, Anjalee K. Depression and social support as mediators between coping strategies and quality of life in pulmonary tuberculosis patients. BMC Psychology. 2026;14(1): 672. doi: 10.1186/s40359-026-04309-8.
16. Chen L. Effectiveness of the Roy adaptation model-based nursing intervention in improving physiological, psychological, and social outcomes in patients with Parkinson's disease. BMC Neurology. 2025;25(1): 219. doi: 10.1186/s12883-025-04232-2.
17. Demirel C, Kiliç SP. The effects of education based on the Roy adaptation model on medication adherence and psychosocial adjustment in hypertensive patients. Journal of Vascular Nursing. 2024;42(2): 89-98. doi: 10.1016/j.jvn.2024.01.003.
18. Wang Y. Roy Adaptation Model-Based nursing care improves quality of life for elderly burn patients. American Journal of Translational Research. 2025;17(6): 4679-4688. doi: 10.62347/uwny6958.
19. Marin PM, Tryland M, Munyeme M, et al. Elucidating the knowledge, attitude, and stigma associated with tuberculosis: a community based descriptive study in Wau and Jur River, South Sudan. Tropical Medicine and Health. 2025;53(1): 15. doi: 10.1186/s41182-025-00696-7.
20. Maibvise C, Shongwe M, Jele V, et al. Perceptions about tuberculosis and perceived tuberculosis-related stigma and associated factors among the mining community in Eswatini. African Health Sciences. 2022;22(1): 551-9. doi: 10.4314/ahs.v22i1.64.
21. Liang H, Hou J, Xiong J. Effect of Family-Centered Empowerment Model in Home Care of Older Adult Patients After Total Knee Arthroplasty. Journal of Community Health Nursing. 2024;41(3): 162-174. doi: 10.1080/07370016.2023.2276744.
22. Foster I, Biewer A, Vanqa N, et al. "This is an illness. No one is supposed to be treated badly": community-based stigma assessments in South Africa to inform tuberculosis stigma intervention design. BMC Global and Public Health. 2024;2(1): 41. doi: 10.1186/s44263-024-00070-5.
23. Chen X, Xu J, Chen Y, et al. The relationship among social support, experienced stigma, psychological distress, and quality of life among tuberculosis patients in China. Scientific Reports. 2021;11(1): 24236. doi: 10.1038/s41598-021-03811-w.
24. Chen X, Chen Y, Zhou L, et al. The role of self-esteem as moderator of the relationship between experienced stigma and anxiety and depression among tuberculosis patients. Scientific Reports. 2023;13(1): 6889. doi: 10.1038/s41598-023-34129-4.
25. Adejumo OA, Jinabhai C, Daniel O, et al. The effects of stigma and social support on the health-related quality of life of people with drug resistance tuberculosis in Lagos, Nigeria. Quality of Life Research. 2025;34(5): 1305-1316. doi: 10.1007/s11136-025-03902-5.
26. Akhtar N, Batool I, Khan MZ. Perceived Stigma, Social Support and Quality of Life in Patients of Tuberculosis. Pakistan Journal of Health Sciences. 2023;4(1): 89-93. doi: 10.54393/pjhs.v4i01.490.
27. Shamla F, Chaudhari B, Chaudhury S, et al. Comparison of depression, anxiety, stigma, stress, and quality of life in patients with multidrug-resistant tuberculosis and pulmonary tuberculosis. Industrial Psychiatry Journal. 2026. doi: 10.4103/ipj.ipj_419_24.
28. Lutfian L, Azizah A, Wardika IJ, et al. The role of family support in medication adherence and quality of life among tuberculosis patients: A scoping review. Japan Journal of Nursing Science. 2025;22(1): e12629. doi: 10.1111/jjns.12629.
29. Vaidya S, Bajaj E, Khurana AK, et al. Change in psychological parameters and quality of life among individuals with pulmonary and extrapulmonary tuberculosis following the intensive phase of therapy: A longitudinal observational study from central India. Indian Journal of Tuberculosis. 2024;71: S208-S213. doi: 10.1016/j.ijtb.2024.04.008.
30. Samuel R, Natesan S, Bangera MK. Quality of life and associating factors in pulmonary tuberculosis patients. Indian Journal of Tuberculosis. 2023;70(2): 214-221.
doi: 10.1016/j.ijtb.2022.05.005.
31. Miharsih IF, Ulfah M, Maryoto M. The Relationship Between Family Support And The Quality Of Life Of Tuberculosis Patients In The Kembaran 1 Banyumas Community Health Center Area. International Journal of Health Engineering and Technology. 2026;5(1). doi: 10.55227/ijhet.v5i1.730.
32. Saidi SS, Abdul Manaf R. Effectiveness of family support health education intervention to improve health-related quality of life among pulmonary tuberculosis patients in Melaka, Malaysia. BMC Pulmonary Medicine. 2023;23(1): 139. doi: 10.1186/s12890-023-02440-5.
33. Kim SH, Lee H, Kim Y. Health-related quality of life after pulmonary tuberculosis in South Korea: analysis from the Korea National Health and Nutrition Examination Survey between 2010 and 2018. Health and Quality of Life Outcomes. 2021;19(1): 195. doi: 10.1186/s12955-021-01833-6.

E-ISSN 2776-2629
https://doi.org/10.37275/icejournal.v6i1.63

34. Kim HJ. Associations between Self-esteem, Social Support, Family Empowerment, and Health Empowerment among Children during the COVID-19 Pandemic. Research in Community and Public Health Nursing. 2025;36: 49. doi: 10.12799/rcphn.2024.00794.
35. Mizumoto A. Calculating the Relative Importance of Multiple Regression Predictor Variables Using Dominance Analysis and Random Forests. Language Learning. 2023;73(1): 161-196. doi: 10.1111/lang.12518.
36. Rahmatullah I, Akbar SA, Susilawati R. A case-control study of environmental risk factors for pulmonary tuberculosis: housing density, indoor humidity, and smoking habits. Jurnal Info Kesehatan. 2025;23(4): 856-867.
doi: 10.31965/infokes.vol23.iss4.2069.
37. Yulida Y, Suhartono E, Anggraini D, et al. Integrating housing environmental factors into the SEIR model for pulmonary tuberculosis transmission: a case study in Banjar, Indonesia. BAREKENG: Jurnal Ilmu Matematika dan Terapan. 2025;20(1): 711-728. doi: 10.30598/barekengvol20iss1pp0711-0728.
38. Wiehn E, Ricci C, Alvarez-Perea A, et al. Adherence to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist in articles published in EAACI Journals: A bibliographic study. Allergy. 2021;76(12): 3581-3588. doi: 10.1111/all.14951.
39. Fuady A, Arifin B, Yunita F, et al. Stigma towards people with tuberculosis: a cross-cultural adaptation and validation of a scale in Indonesia. BMC Psychology. 2023;11(1): 112. doi: 10.1186/s40359-023-01161-y.
40. Bergman A, McNabb K, Farley JE. A systematic review and psychometric appraisal of instruments measuring tuberculosis stigma in Sub-Saharan Africa. Stigma and Health. 2024;9(1): 81-93. doi: 10.1037/sah0000328.
41. Kodical SP, Roy R, Shetty D, et al. Exploring factors influencing the health-related quality of life of tuberculosis patients: a WHOQOL-BREF-based study. Monaldi Archives for Chest Disease. 2024. doi: 10.4081/monaldi.2024.2913.
42. Sulistiani W, Fajrianthi F, Kristiana IF. Validation of the Indonesian Version of the Multidimensional Scale of Perceived Social Support (MSPSS): A Rasch Model Approach. Jurnal Psikologi. 2022;21(1): 89-103. doi: 10.14710/jp.21.1.89-103.
43. Muslih M, Chung MH. Structural validity of the Rosenberg self-esteem scale in patients with schizophrenia in Indonesia. PLOS ONE. 2024;19(5): e0300184. doi: 10.1371/journal.pone.0300184.
44. Huh I, Gim J. Exploration of Likert scale in terms of continuous variable with parametric statistical methods. BMC Medical Research Methodology. 2025;25(1): 218. doi: 10.1186/s12874-025-02668-1.
45. Kumpuangdee S, Roomruangwong C, Sophonphan J, et al. Prevalence of depression and anxiety in pulmonary tuberculosis patients and its association with unsuccessful treatment outcome: A prospective cohort study. Indian Journal of Tuberculosis. 2023;70(3): 297-302. doi: 10.1016/j.ijtb.2022.05.007.
46. Rouf A, Masoodi MA, Dar MM, et al. Depression among Tuberculosis patients and its association with treatment outcomes in district Srinagar. Journal of Clinical Tuberculosis and Other Mycobacterial Diseases. 2021;25: 100281. doi: 10.1016/j.jctube.2021.100281.
47. Tozoglu EO, Gürbüzer N. Internalized stigma level, family self-stigma, and family burden of patients receiving community mental health center services: a comparative, longitudinal study. Frontiers in Psychiatry. 2024;15: 1469448. doi: 10.3389/fpsyt.2024.1469448.
48. Deng Z, Xiao H, Hong J. Role of social support in the relationship between health empowerment and quality of life among elderly pulmonary tuberculosis patients in mainland China: A moderation study. Medicine. 2025;104(43): e45247.
doi: 10.1097/md.0000000000045247.
49. Moonsarn S, Kasetjaroen Y, Bettex-Baars AM, et al. A Communication-Based Intervention Study for Reducing Stigma and Discrimination against Tuberculosis among Thai High-School Students. International Journal of Environmental Research and Public Health. 2023;20(5): 4136. doi: 10.3390/ijerph20054136.
50. Zhang W, Henderson C, Magnusdottir E, et al. Effect of a contact-based education intervention on reducing stigma among community health and care staff in Beijing, China: Pilot randomized controlled study. Asian Journal of Psychiatry. 2022;73: 103096. doi: 10.1016/j.ajp.2022.103096.
51. Carvalho ACC, Kritski AL. Community-based intervention and health education to scale up TB preventive treatment for children. The International Journal of Tuberculosis and Lung Disease. 2022;26(7): 587-589. doi: 10.5588/ijtld.22.0254.
52. Fitriadi Y. Effort to Control Pulmonary Tuberculosis (TB) in the Community through Tuberculosis Alert Health Cadre Training. Journal of Community Empowerment for Health. 2023;6(3): 133. doi: 10.22146/jcoemph.77331.
53. Yanni DAP. Community empowerment for health service integration in disaster-prone rural Indonesia: a multidisciplinary literature review. Journal of Community Empowerment for Health. 2026;9(1): 17. doi: 10.22146/jcoemph.106755.
54. Gadsden T, Sujarwoto S, Purwaningtyas N, et al. Understanding community health worker employment preferences in Malang district, Indonesia, using a discrete choice experiment. BMJ Global Health. 2022;7(8): e008936. doi: 10.1136/bmjgh-2022-008936.
55. Gadsden T, Maharani A, Sujarwoto S, et al. Does social capital influence community health worker knowledge, attitude and practices towards COVID-19? Findings from a cross-sectional study in Malang district, Indonesia. SSM - Population Health. 2022;19: 101141. doi: 10.1016/j.ssmph.2022.101141.
56. Nindrea RD, Novera M, Armaita, et al. Tuberculosis-related stigma, patient motivation and treatment adherence among patients with pulmonary tuberculosis in a high tuberculosis burden area of West Sumatra Province Indonesia. Discover Public Health. 2026;23(1): 676. doi: 10.1186/s12982-026-02033-7.
57. Adejumo OA, Daniel OJ, Jinabhai C, et al. Treatment Adherence among People with Drug-resistant Tuberculosis in Lagos Nigeria: The Effects of Stigma, Resilience, Social Support, and Temporal Discounting. The International Journal of Mycobacteriology. 2025;14(1): 36-42. doi: 10.4103/ijmy.ijmy_209_24.
58. Quyen BTT, Sang TN, Tien ND, et al. Associations of depression, anxiety, and perceived stigma with treatment adherence among pulmonary tuberculosis patients at a provincial tuberculosis hospital in Southern Vietnam. Discover Public Health. 2026;23(1): 942. doi: 10.1186/s12982-026-02341-y.
59. Pradhan A, Koirala P, Bhandari SS, et al. Internalized and Perceived Stigma and Depression in Pulmonary Tuberculosis: Do They Explain the Relationship Between Drug Sensitivity Status and Adherence?. Frontiers in Psychiatry. 2022;13: 869647. doi: 10.3389/fpsyt.2022.869647.
60. Maynard C, Tariq S, Sotgiu G, et al. Psychosocial support interventions to improve treatment outcomes for people living with tuberculosis: a mixed methods systematic review and meta-analysis. eClinicalMedicine. 2023;61: 102057. doi: 10.1016/j.eclinm.2023.102057.
61. Melizza N, Hargono R, Makhfudli. A supportive-educative intervention for tuberculosis patients: integrated self-care and family-centered nursing. Russian Open Medical Journal. 2022;11(1). doi: 10.15275/rusomj.2022.0106.
62. Pandini I, Lahdji A, Noviasari NA, et al. The effect of family social support and self esteem in improving the resilience of tuberculosis patients. Media Keperawatan Indonesia. 2022;5(1): 14-21. doi: 10.26714/mki.5.1.2022.14-21.
63. Olabisi OI, Ajala D, Odira C, et al. Relationship between psychological distress, social support and medication adherence among hypertensive patients in Nigeria. Enfermería Clínica (English Edition). 2026;36(5): 502480.
doi: 10.1016/j.enfcle.2026.502480.
64. Elavarasi EA, Smitha MC, Manasa K, et al. Depression and stigma experience among patients with tuberculosis in urban and rural settings. Indian Journal of Tuberculosis. 2024;71(S2): S171-S177. doi: 10.1016/j.ijtb.2023.03.008.
65. Godana TN, Mekonnen FA, Derseh NM. Development and Internal Validation of a Clinical Risk Score for Loss to Follow-Up Among Drug-Resistant Tuberculosis Patients in a High-Burden Setting, Ethiopia: A Multicenter Retrospective Study. Journal of Clinical Epidemiology. 2026;112443.
doi: 10.1016/j.jclinepi.2026.112443.
66. Islam S, Das S, Das DK. Nutritional status and adherence to anti-tubercular treatment among tuberculosis patients in a community development block of Eastern India. Indian Journal of Tuberculosis. 2024;71: S178-S183.
doi: 10.1016/j.ijtb.2023.04.005.
67. Kumwichar P, Prappre T, Chongsuvivatwong V. Tuberculosis Treatment Compliance Under Smartphone-Based Video-Observed Therapy Versus Community-Based Directly Observed Therapy: Cluster Randomized Controlled Trial. JMIR mHealth and uHealth. 2024;12: e53411. doi: 10.2196/53411.