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Preference-Based Assessments

Analysis of Health-Related Quality of Life and Incurred Costs Among Human Immunodeficiency Virus, Tuberculosis, and Tuberculosis/HIV Coinfected Outpatients in Indonesia

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A B S T R A C T

Objectives: A growing interest in healthcare costs and patients' health-related quality of life (HRQoL) exists in the context of the increasing importance of health technology assessment in countries with high numbers of the HIV and tuberculosis (TB) patient populations, such as Indonesia. This study aimed to analyze the HRQoL and out-of-pocket (OOP) costs of HIV, TB, and TB/HIV coinfected participants in a city in Indonesia with a high prevalence of HIV and TB.

Methods: A cross-sectional survey was conducted in the voluntary counseling and testing and lung clinics of Bekasi City Public Hospital (Indonesia) from January to March 2018. Patients' HRQoL was measured using the EQ-5D-5L questionnaire, whereas OOP costs were extracted from a semistructured questionnaire.

Results: Of the 460 eligible participants, 82% resided in the city, 48% of them were married, and their median age was 34 years. Less than half were insured, and more than half had no source of income. The median values of health utilities for participants with HIV, TB, and TB/HIV were perceived as potentially high (1.0, 0.9, and 0.8, respectively). The TB/HIV coinfected outpatients had the highest OOP costs (US$94.5), with the largest contribution coming from direct medical OOP expenditures. Taking loans from family members was adopted as a financial strategy to overcome inadequate household incomes and high treatment costs.

Conclusion: This study suggests that TB/HIV coinfection potentially lowers HRQoL and increases healthcare costs and the need for economic analysis to underpin cost-effective treatment in such patients.

Keywords: healthcare costs, health-related quality of life, HIV, tuberculosis.

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Introduction

The discovery and scaling up of access to combined antiretroviral therapy (cART) for people living with HIV (PLHIV) have shifted the nature of HIV infection from deadly to chronic.[1,2] PLHIV experience improved health, longer life, and lower rates of HIV transmission and disease-related deaths after the introduction of cART. Tuberculosis (TB) is known as the leading cause of AIDS-related deaths and seems to accelerate the progression of HIV infection,[3] with 1 in every 3 deaths in patients with AIDS.[4] The infections of both diseases pose significant health threats to the community, particularly in middle- and low-income countries with a high burden of the aforementioned dual infections. Therefore, the burden of HIV and TB disease management and costs have unavoidably risen.[1,2]

Indonesia has extensively implemented HIV and TB treatment strategies by adopting World Health Organization–recommended programs, such as voluntary counseling and testing (VCT), directly observed treatments, and collaborative TB/HIV activities.[5] These strategies allow PLHIV and patients with TB to receive free-of-charge treatments in VCT and TB clinics.[6] According to the Joint United Nations Programme on HIV/AIDS, Indonesia spent a total of US$106 794 597 on HIV-related expenses in 2014, which consisted of domestic public expenditures (57%), domestic private expenditures (0.02%), and international expenditures (42%).[6] The number of covered HIV/AIDS cases in Indonesia has then doubled compared with the period preceding universal health coverage, and it is anticipated that overall healthcare expenditure will rise as well in the future, particularly for TB/HIV coinfected patients treatments.[7]

To provide the best possible healthcare and lessen the burden of illness on patients with HIV and TB, it is vital to recognize the health-related quality of life (HRQoL) and the out-of-pocket (OOP) expenses associated with treatment. However, little is known about the burden on HRQoL and OOP expenditures for HIV and TB outpatients in Indonesia. Therefore, this study aimed to investigate the HRQoL and OOP costs of patients with HIV, TB, and TB/HIV in a city in Indonesia where HIV and TB are prevalent.

Methods

Study Design, Setting, and Population

This cross-sectional survey examined the HRQoL and OOP costs of the selected study participants from January 2018 to March 2018. The investigation took place in VCT and lung clinics, Bekasi City Public Hospital, West Java, Indonesia. There were 2.9 million people living in the city with a density of 13 985 people per square kilometer in 2018.[8] Bekasi City in West Java had 560 HIV-positive individuals and 4144 TB cases in 2017, which placed the city as one of the cities with a high prevalence of HIV and TB infections in West Java.[8]

Study participants were selected consecutively if they met the following inclusion criteria: male or female aged 18 or older and (1) had TB and underwent therapy at the time of data collection (TB only); (2) were HIV positive, receiving cART treatment, and without a history of previous TB diagnosis (HIV only); or (3) were diagnosed of and receiving therapy for both TB and HIV at the time of data collection (TB/HIV).

The study used 2 questionnaires: first, a questionnaire form designed by us which incorporated relevant information in the questionnaire to collect participants' sociodemographic characteristics and OOP expenses. Second, the Indonesian version of the EQ-5D-5L questionnaire to assess health utility as a representation of total health status. The survey data were collected by 2 VCT and lung clinic field investigators (enumerators), whose responsibilities were to collect the study data following the study participants' consent. The principal researchers instructed both enumerators on how to retrieve data. The Ethics Committee of Persahabatan General Hospital (63/KEPK-RSUPP/12/2017) granted research ethics approval, and the Bekasi City Public Hospital authorized the use of survey data. All study participants provided an informed consent in writing.

Study Procedures

Each trained enumerator asked research participants about their gender, age, marital status, household conditions (eg, number of family members and kind of settlement), employment status, and household income. Researchers sought detailed disease information to characterize study participants, including type, risk factor(s), treatment duration, and medication regimens. Next, study participants filled in their monthly OOP costs, including direct medical, direct nonmedical, and indirect OOP. Direct medical OOP costs included self-paid outpatient, inpatient, and laboratory costs throughout therapy. Direct nonmedical expenses included monthly medical transportation, caretaker costs, treatment food and beverage costs, and other medical-related costs. By measuring hospital clinic visits and monthly wages, productivity loss due to illness was assessed as an indirect cost.

This study descriptively explores diseases' burdens on working and financial and participants' coping strategy to overcome the disease's burden and maintain their quality of life and wellbeing during therapy. Disease consequences were categorized as not working/studying, quitting work/school for some time, quitting completely owing to illness, and did not have a job at the start of the treatment. We chose physical and religious strategy as participants' coping mechanism.

Participants completed the EuroQol Group's EQ-5D-5L questionnaire, a preference-based HRQoL measure. EQ-5D-5L includes a descriptive system and a visual analog scale (EQ-VAS).[9] The EuroQol Group has approved the use of the EQ-5D-5L questionnaire in this study. Clinical trials and demographic research worldwide have used it to assess general health status for economic goals. The EQ-5D-5L questionnaire comprises 5 dimensions—mobility, self-care, regular activities, pain/discomfort, and anxiety/depression—and 5 response levels (from no problems to unable to/extreme

problems). Participants rated dimension severity. No problem was coded "1," slight problems was "2," moderate was "3," severe was "4," and unable/extreme problems was "5." Weighting severity levels in the 5 dimensions according to Indonesian value set yielded a single-digit utility. Conversely, the EQ-VAS measures a person's health status on a 0 to 100 scale. On the day of the survey, participants were asked to visualize and indicate one point of their health.

Statistical Analysis

The analysis in this study comprised 4 parts. First, we described the participants' sociodemographic and disease profile characteristics. The survey also included detailed questions on the number of visits to various providers, including our study clinic, other public facilities, general practitioners, hospitals, traditional healers, and pharmacies. Second, we calculated the EQ-5D utility scores (U_{EQ-5D}) by assuming that a high health utility value and vice versa would represent a person's better health condition or performance. We transformed the U_{EQ-5D} values from the 5-digit coded health states using a formula derived from the Indonesian utility score algorithm.[10] The U_{EQ-5D} ranges from 0.0 (death) to 1.0 (full health), in which a score <0 representing a state worse than death is possible.[9] We also calculated EQ-VAS scores (U_{VAS}) to complement U_{EQ-5D} by transforming the scale of 0-100 to 0.0-1.0. We collected EQ-VAS scores by participants' feel about their own health overall at the day of the survey, which were scored from 0 to 100. We also performed a Bland-Altman approach to evaluate the agreement between the 2 assessment scales.[11,12] The transformation of U_{VAS} and Bland-Altman approach were done following the practice of Kittikraisak et al[13] in their study investigating HRQoL among patients with TB and HIV in Thailand.

Third, tobit regression models were used to assess differences in HRQoL scores among the 3 medical conditions. Tobit regression models are used to estimate linear associations between variables in situations where the dependent variables x and y are subject to censoring at the upper and lower extremes.[14] The P value of the likelihood ratio chi-square was used to measure the model's fit. We determined statistical significance using a 2-sided P value of .05. Fourth, we calculated the health utilities of HIV, TB, and TB/HIV using the multiplicative formula and compared them with the data collected using the EQ-5D and EQ-VAS forms.

Finally, a straightforward descriptive cost analysis was applied to all cost data because of the small sample size of some of the comparison groups. After conducting a normality test, all data, including OOP costs, were transformed into median values and interquartile range (IQR) to account for skewness. All data values were stored digitally in Microsoft Excel for MacOs (Microsoft Corp, Redmond, Washington) before being exported to SPSS version 25 (IBM Corp, Released 2017. IBM Statistics for Windows, Version 25.0, Armonk, NY).

Results

Sociodemographic Characteristics of the Population

The analysis included 460 of the 482 patients who agreed to participate in the investigation. We excluded participants who had already undergone TB treatment and those who did not complete the questionnaire. The analytic data set included 221 participants with HIV, 200 with TB, and 39 with TB/HIV coinfection; 269 of the 460 participants (58.5%) were men, 222 (48.3%) were married, 377 (82.0%) resided in the city, and 358 (77.8%) had a college degree or higher. At the time of the survey, the median age of all participants was 34 years (18-80), 261 (56.7%) had worked, 191 (41.5%) had no monthly household income, and 249 (54.1%) lacked Indonesia's universal health insurance (Badan Penyelenggara Jaminan Sosial, Kesehatan).

Table 1. Sociodemographic and clinical characteristics of participants with HIV, TB, and TB/HIV.

Participants' characteristics	All participants (N = 460)	HIV (n = 221)	TB (n = 200)	TB/HIV (n = 39)
Sociodemographics				
Gender, N/n (%)				
Male	269 (58.5)	135 (61.1)	106 (53.0)	28 (71.8)
Female	190 (41.3)	85 (38.5)	94 (47.0)	11 (28.2)
Refused to answer	1 (0.2)	1 (0.4)	0 (0.0)	0 (0.0)
Age (years), median (IQR)	34 (18-80)	35 (19-66)	33 (18-80)	35 (22-54)
A place to live, N/n (%)				
City	377 (82.0)	177 (80.1)	167 (83.5)	33 (84.6)
Rural	83 (18.0)	44 (19.9)	33 (16.5)	6 (15.4)
Marital status, N/n (%)				
Married	222 (48.3)	97 (43.9)	107 (53.5)	18 (46.2)
Widow/widower	56 (12.2)	37 (16.7)	10 (5.0)	9 (23.1)
Not married	182 (39.6)	87 (39.4)	83 (41.5)	12 (30.8)
Sexual orientation, N/n (%)				
Heterosexual	150 (32.6)	121 (54.8)	16 (8.0)	13 (33.3)
Homosexual	37 (8.0)	35 (15.8)	0 (0.0)	2 (5.1)
Bisexual	41 (8.9)	31 (14.0)	1 (0.5)	9 (23.1)
Refused to answer	232 (50.5)	34 (15.4)	183 (91.5)	15 (38.5)
Level of education, N/n (%)				
Lower education	102 (22.2)	45 (20.4)	52 (26.0)	5 (12.8)
Higher education	358 (77.8)	176 (79.6)	148 (74.0)	34 (87.2)
Occupation, N/n (%)				
No job	97 (21.1)	33 (14.9)	54 (27.0)	10 (25.6)
Had a job	261 (56.7)	140 (63.3)	99 (49.5)	22 (56.4)
Housewife	83 (18.1)	42 (19.0)	35 (17.5)	6 (15.4)
Other	19 (4.1)	6 (2.7)	12 (6.0)	1 (2.6)
Monthly income in US$ in 2018, N/n (%)				
Had no income	191 (41.5)	78 (35.3)	96 (48.0)	17 (43.6)
>282.9	36 (7.8)	17 (7.7)	15 (7.5)	4 (10.3)
94.3-282.9	117 (25.4)	67 (30.3)	43 (21.5)	7 (17.9)
<94.3	116 (25.2)	59 (26.7)	46 (23.0)	11 (28.2)
Living with family members, N/n (%)				
Yes	398 (86.5)	176 (79.6)	188 (94.0)	34 (87.2)
No	62 (13.5)	45 (20.4)	12 (6.0)	5 (12.8)
Insured, N/n (%)				
Yes	211 (45.9)	55 (24.9)	139 (69.5)	17 (43.6)
No	249 (54.1)	166 (75.1)	61 (30.5)	22 (56.4)
Clinical characteristics				
Risk factor for HIV, n (%)				
Sex		171 (72.7)	N/A	28 (70.0)
Injecting drug use		50 (21.3)	N/A	8 (20.0)
Blood transfusion		5 (2.1)	N/A	0 (0.0)
Did not know		0 (0.0)		3 (7.5)
Other		9 (3.9)	N/A	1 (2.5)
CD4 (cell/mm^3) at survey, median (IQR)		342.0 (3.0-1130.0)*	N/A	142.0 (50.0-893.0)[†]
Duration of cART, n (%)				
0-1 year		54 (24.4)	N/A	28 (71.8)
1-5 years		103 (46.6)	N/A	8 (20.5)
> 5 years		64 (29.0)	N/A	3 (7.7)
Risk factor for TB, n (%)				
Living with a patient with TB		N/A	16 (8.0)	3 (7.7)
Had neighbors with TB		N/A	15 (7.5)	2 (5.1)
Did not know		N/A	153 (76.5)	28 (71.8)
Other		N/A	16 (8.0)	6 (15.4)
TB type, n (%)				
Pulmonary TB		N/A	158 (79.0)	36 (92.3)
Extrapulmonary TB		N/A	32 (16.0)	3 (7.7)
Both		N/A	10 (5.0)	0 (0.0)
Phase of TB therapy, n (%)				

Table 1. Continued

Participants' characteristics	All participants (N = 460)	HIV (n = 221)	TB (n = 200)	TB/HIV (n = 39)
Intensive		N/A	58 (29.0)	9 (23.0)
Maintenance		N/A	142 (71.0)	27 (69.3)
Longer than usual duration		N/A	0 (0.0)	3 (7.7)
Duration of TB drug therapy, days (median, IQR)		N/A	111.5 (54.5-174.5)	159 (82-283)

cART indicates combined antiretroviral therapy; IQR, interquartile range; N/A, not applicable; TB, tuberculosis.
*Median value from 114 participants with HIV.
†Median value from 17 participants with TB/HIV coinfection.

Most of HIV-infected study participants informed that sexual activity as the risk factor for developing HIV and TB/HIV, whereas 153 patients with TB (76.5%) and 28 patients with TB/HIV (71.8%) did not know how they contracted TB. All participants received treatment for the disease(s). Sixty-four patients with HIV (29%) had been on cART for >5 years, with a median CD4 cell count of 342.0 cells/mm3 (3.0-1130.0) for HIV alone and 142.0 cells/mm3 (50.0-890.0) for participants with TB/HIV coinfection. Pulmonary TB (PTB) was the most prevalent form of TB in both patients with TB and TB/HIV, and 10 patients with TB (5%) were diagnosed of both PTB and extra-PTB. At the time of data collection, most patients with TB were in the maintenance phase of treatment, which lasted a median of 115 days. The sociodemographic and clinical characteristics of the participants are presented in Table 1.

HRQoL Measurement Using EQ-5D-5L Instrument

A total of 460 participants had U_{EQ-5D} scores from −0.4 to 1.0 (median 0.9; IQR 0.8-1.0). An HIV-positive participant rated their health as worse than death (U_{EQ-5D} at −0.39) because she had an abscess, toxoplasmosis, and HIV since 2010. Sixty-eight participants with HIV, 114 with TB, and 9 with TB/HIV felt healthy (U_{EQ-5D} 1.0). The median U_{EQ-5D} scores of 460 participants are presented in Table 2. Patients with HIV had the greatest median U_{EQ-5D} (1.0; IQR 0.9-1.0), and patients with TB/HIV had the lowest (0.8; 0.7-0.9).

This study reported that participants' U_{VAS} was 0.3 to 1.0 (median 0.8; IQR 0.7-0.9). At the survey, 1 participant with HIV and 1 participant with TB/HIV assessed their health as low as 0.3, with U_{VAS} scores of 0.5 and 0.4, respectively. Eleven subjects with HIV, 25 with TB, and 4 with TB/HIV rated their health as healthy. All groups had a median U_{VAS} of 0.8 (IQR 0.6-0.9).

Differences in Response Level of HRQoL Among Selected Participants

A total of 460 participants used the EQ-5D-5L to rate their health conditions (Table 3). Most TB/HIV study participants had no mobility or self-care issues. More participants reported severity levels in regular activities, pain, and anxiety. Thirty-five participants with TB (17.5%), 7 individuals with TB/HIV (18.0%), and 1 participant with TB/HIV had slight difficulties completing their typical activities. Forty-three subjects with HIV, 82 with TB, and 16 with TB/HIV reported minor pain. Four patients with TB/HIV had significant discomfort, and one could not tolerate pain. Similar to regular activity and discomfort, 72 subjects with HIV (32.5%), 58 with TB (29.0%), and 13 with TB/HIV (33.3%) had slight worry. Two patients with TB/HIV had severe anxiety.

Concordance Between U_{EQ-5D} and U_{VAS}

We conducted a Bland-Altman analysis to ascertain the consistency or degree of agreement between the U_{EQ-5D} and U_{VAS}.

The line of mean difference (average bias) is positioned at −0.08 in Figure 1. The 95% agreement limit was shown to be between −0.04 and 0.30. The correlation coefficient between the U_{EQ-5D} and U_{VAS} was 0.3, indicating a moderate degree of concordance. Ninety-seven participants rated their U_{EQ-5D} as equivalent to U_{VAS}, 76 rated their U_{EQ-5D} as higher than U_{VAS}, and 287 rated their health utility as lower than UVAS.

Predictor of HRQoL

In the tobit regression analysis, factors independently predictive of U_{EQ-5D} included medical conditions, age, and monthly household income. TB was rated as significantly affecting the U_{EQ-5D} of patients with HIV (95% CI −0.1 to 0.0), whereas age and monthly household income were not predictors of the change in health utility. In the U_{VAS} analysis, we did not find any predictive factors of U_{VAS}. The tobit regression analysis is presented in Appendix Table 1 in Supplemental Materials found at https://doi.org/10.1016/j.vhri.2023.10.010.

Time Spent to Access Health Services

The Bekasi City Public Hospital provides integrated HIV and TB treatments. Patients may visit other healthcare providers outside the hospital without compromising the hospital's quality and quantity of health services. All groups averaged one day of "integrated" visits per month during their treatment for testing or picking up routine medications. All participants made relatively few visits to providers outside the public health system, with a negligible proportion of participants in each group seeking a "second opinion" from other medical providers. The median number of clinic visits to the hospital and the proportion of participants who sought health services outside the hospital are presented in Appendix Table 2 in Supplemental Materials found at https://doi.org/10.1016/j.vhri.2023.10.010.

OOP Costs

The monthly patient-incurred OOP health expenses for the 3 participant groups are presented in Table 4. Participants with TB/HIV reported the highest median monthly total OOP costs during the treatment period, doubling the total OOP costs for patients with TB and HIV (US$94.5 vs US$47.6, TB, and US$43.5, HIV, respectively); 59.5% of the total OOP costs for participants with TB/HIV were attributable to direct OOP costs, followed by 58.4% for participants with HIV and 50.8% for participants with TB.

The direct OOP costs incurred by participants ranged from US$24.2 (IQR US$12.8-US$54.1) per month for participants with TB to US$56.2 (IQR US$34.0-US$100.5) per month for participants with TB/HIV, with the direct OOP costs for participants with HIV falling in the middle. Direct OOP costs were primarily driven by the additional clinical tests and nutritional supplements. The monthly direct medical OOP costs ranged from US$18.9 (TB) and

Table 2. Participants' HRQoL using the EQ-5D-5L instrument.

Participants	% Receiving cART therapy	n	HRQoL scores by EQ-5D-5L instrument (median)			
			Median U_{EQ-5D} (IQR)	SD	Median U_{VAS} (IQR)	SD
HIV	100	221	1.0 (0.9-1.0)	0.1	0.8 (0.7-0.9)	0.1
TB	N/A	200	0.9 (0.8-1,0)	0.2	0.8 (0.7-0.9)	0.1
TB/HIV	100	39	0.8 (0.7-0,9)	0.2	0.8 (0.6-0.9)	0.2

cART indicates combination of antiretroviral therapy; HRQoL, health-related quality of life; IQR, interquartile range; N/A, not applicable; TB, tuberculosis; VAS, visual analog scale.

US$22.9 (HIV) to US$50.5 (TB/HIV), representing 78.1% of direct OOP costs compared with total OOP costs among participants with TB, 90.2% of direct costs for participants with HIV, and 89.8% of direct expenses for participants with TB/HIV. Participants in the study, particularly patients with HIV who sought care from facilities other than the study clinic at Bekasi City Public Hospital, reported that they visited alternative therapies (eg, traditional medicines), self-medication, and private clinics to maintain their health. Patients with HIV reported the greatest median value of alternative treatment compared with other groups.

This study determined indirect costs by calculating the number of clinic visits, and it was found that participants visited the clinic a median of 1.0 days per month. Thus, the median monthly income loss for all participant categories was US$14.8, which is considered low.

Coping Mechanism

The proportion of issues for all participant groups in relation to work activities that led to a financial burden are presented in Table 5. There were 30 participants with HIV (13.6%), 27 participants with TB (13.5%), and 13 participants with TB/HIV (33.3%) who were forced to quit their work due to the diseases. Several participants from all groups revealed that the diseases affected their normal activity, and therefore, they left their jobs to continue with their treatment. In contrast, 124 participants with HIV (56.1%), 101 participants with TB (50.5%), and 17 participants with TB/HIV (43.6%) reported that they continued their work or school throughout treatment.

Due to their illness, the study participants adopted various financial strategies to overcome income loss and OOP expenses.

Table 3. Participants' responses to EQ-5D-5L instrument.

Dimension – level	Proportion (%) of EQ-5D responses level		
	HIV (n = 221)	TB (n = 200)	TB/HIV (n = 39)
Mobility			
No problem	211 (95.5)	166 (83.0)	33 (84.6)
Slight problem	8 (3.5)	28 (14.0)	5 (12.8)
Moderate problem	1 (0.5)	4 (2.0)	0 (0.0)
Severe problem	0 (0.0)	2 (1.0)	1 (2.6)
Unable/extreme problem	1 (0.5)	0 (0.0)	0 (0.0)
Self-care			
No problem	219 (99.0)	188 (94.0)	39 (100.0)
Slight problem	1 (0.5)	6 (3.0)	0 (0.0)
Moderate problem	0 (0.0)	4 (2.0)	0 (0.0)
Severe problem	1 (0.5)	2 (1.0)	0 (0.0)
Unable/extreme problem	0 (0.0)	0 (0.0)	0 (0.0)
Usual activities			
No problem	205 (92.7)	148 (74.0)	29 (74.4)
Slight problem	13 (5.9)	35 (17.5)	7 (18.0)
Moderate problem	1 (0.5)	10 (5.0)	2 (5.1)
Severe problem	2 (0.9)	4 (2.0)	0 (0.0)
Unable/extreme problem	0 (0.0)	3 (1.5)	1 (2.5)
Pain			
No problem	170 (77.0)	97 (48.5)	17 (43.6)
Slight problem	43 (19.5)	82 (41.0)	16 (41.0)
Moderate problem	7 (3.0)	14 (7.0)	1 (2.5)
Severe problem	1 (0.5)	7 (3.5)	4 (10.3)
Unable/extreme problem	0 (0.0)	0 (0.0)	1 (2.6)
Anxiety			
No problem	126 (57.0)	122 (61.0)	15 (38.5)
Slight problem	72 (32.5)	58 (29.0)	13 (33.3)
Moderate problem	18 (8.1)	16 (8.0)	7 (18.0)
Severe problem	4 (1.9)	4 (2.0)	2 (5.1)
Unable/extreme problem	1 (0.5)	0 (0.0)	2 (5.1)

TB indicates tuberculosis.

Figure 1. Bland-Altman plot showing the differences between health utilities measured using EQ-5D and EQ-VAS in relation to the mean of the 2 measurements among 460 Indonesian patients in which moderate U_{EQ-5D} and U_{VAS} agreement was observed. Dashed lines are plotted indicating the limits of agreement (mean $\pm$ 1.96*SD).
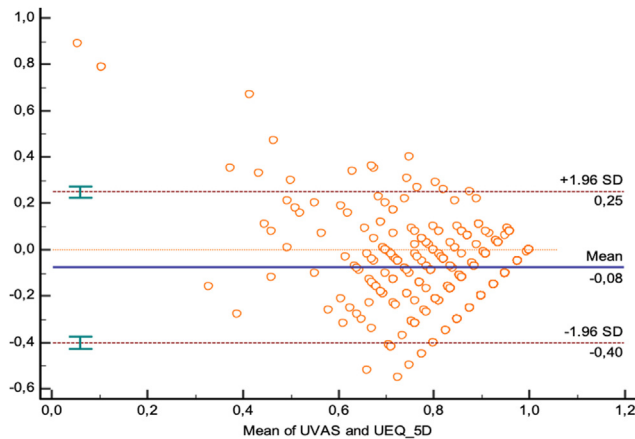
U_{EQ-5D} indicates health utility measured using EQ-5D-5L instrument; U_{VAS}, participants' perspectives on overall health status, described using EQ-VAS instrument; SD, standard deviation.

Although many participants stated that they did not have problems with household income, 81 participants with HIV (36.5%), 94 participants with TB (46.5%), and 23 participants with TB/HIV (59.0%) disclosed that family member(s) provided help through loans or grants. Similarly, although more than half of the participants in each group reported no problems with the disease, 53 participants with HIV (21.5%), 106 participants with TB (48.8%), and 15 participants with TB/HIV (34.9%) adopted physical activities as a coping strategy to maintain their health, followed by religious activities.

Discussion

We found that the HRQoL for all study groups was high, with participants with TB/HIV perceiving the lowest health utility value (median of 0.8) compared with participants with HIV and TB. TB was found to be the determinant factor of the U_{EQ-5D}, given that it affects the health utilities of patients receiving treatment. There was a moderate inconsistency in participants' perceive of U_{EQ-5D} and U_{VAS}, suggesting different measures resulted in different HRQoL scores. The study also descriptively analyzed OOP healthcare costs and participants' coping strategies regarding financial and health status in participant groups. Direct medical OOP costs presented a high proportion of contribution to the total direct OOP costs, with the greatest direct OOP costs seen in participants with TB/HIV (median value of US$50.5), or 59.5% of the total OOP costs incurred during TB/HIV therapy. Furthermore, direct medical OOP costs contributed as much as 89.8% of the total direct OOP costs for participants with TB/HIV. Taking loans or grants from family members is a financial strategy to cope with household financial issues. In addition, participants adopted physical and religious activities as their way to maintain and improve their health status.

We expected skewness of the data and outliers because the numbers of participants with TB/HIV coinfection were smaller than participants with HIV and TB. Therefore, the study data were analyzed using median values. All participants in this study were individuals of productive age, with a median age of 34 years, lived in the city (82.0%), had a college degree (77.8%), and were employed (56.7%). In addition, more than half of the participants in our study were uninsured (54.1%), notably HIV-positive patients. The descriptive analysis revealed that the emergence of HIV and TB as infectious diseases in Indonesian households poses a risk of catastrophic costs.

To the best of our knowledge, this is the first study in Indonesia to evaluate the concordance or agreement of HRQoL measured by the U_{EQ-5D} and U_{VAS} among HIV, TB, and TB/HIV coinfected outpatients and determine the risk factors influencing the health

Table 4. Participants' monthly direct and indirect OOP costs incurred during treatment (in US$ in 2018).

Cost component	Median (min-max) of the OOP costs		
	HIV (n = 221)	TB (n = 200)	TB/HIV (n = 39)
Direct OOP costs (US$)			
Direct medical OOP costs	22.9 (2.8-49.6)	18.9 (10.8-47.5)	50.5 (23.9-85.4)
Outpatient costs	2.1 (2.1-3.2)	4.7 (4.7-8.7)	11.6 (3.5-35.1)
Other medical-related expenses	3.2 (2.1-7.5)	9.2 (4.4-23.2)	14.1 (3.8-29.1)
Laboratory findings costs of CD4	20.7 (20.7-20.7)	-	20.7 (20.7-20.7)
Laboratory findings costs of VL	145.7 (145.7-145.7)	-	145.7 (145.7-145.7)
Chest x-ray test	5.7 (5.7-5.7)	8.5 (8.5-8.5)	8.5 (5.7-8.5)
Other laboratory tests	29.2 (19.8-48.2)	7.5 (3.8-33.3)	24.3 (19.8-51.5)
Costs of other medical provider(s) outside study clinic	33.0 (10.4-44.8)	21.7 (15.3-41.5)	4.7 (2.4-4.7)
Direct nonmedical OOP costs	5.2 (3.3-9.4)	7.5 (4.0-15.1)	9.4 (6.1-18.9)
Patient's travel costs	1.9 (1.1-3.3)	2.4 (1.4-4.7)	3.3 (1.8-6.6)
Caregiver's travel costs	1.9 (0.9-2.8)	2.4 (0.9-4.7)	4.7 (0.9-11.3)
Expenses on food and drink	2.8 (1.9-4.7)	4.2 (1.9-9.4)	4.7 (2.8-9.4)
Other nonmedical costs	0.5 (0.3-1.1)	0.8 (0.5-1.9)	0.9 (0.4-1.9)
Total direct OOP costs	25.4 (7.7-53.1) (58.4%*)	24.2 (12.8-54.1) (50.8%*)	56.2 (34.0-100.5) (59.5%*)
Indirect OOP costs (US$)			
Patient income loss due to treatment	14.8 (14.8-14.8)	14.8 (14.8-29.5)	14.8 (14.8-29.5)
Total OOP costs incurred (US$)	43.5 (23.0-75.2)	47.6 (31.9-79.3)	94.5 (62.7-153.4)

max indicates maximum; min, minimum; OOP, out-of-pocket; TB, tuberculosis; VL, viral load.
*Percentage of the overall total cost.

Table 5. Work, financial, and coping strategies concerning HIV, TB, and TB/HIV coinfection.

Disease-related issues and strategies	Proportion (%) of work, financial, and coping strategies		
	HIV (n = 221)	TB (n = 200)	TB/HIV (n = 39)
Disease-related work issues			
Continue working/studying	124 (56.1)	101 (50.5)	17 (43.6)
Stop working/studying temporarily	24 (10.9)	29 (14.5)	5 (12.8)
Quit working/studying	30 (13.6)	27 (13.5)	13 (33.3)
Had no job at start of treatment	43 (19.5)	42 (21.0)	4 (10.3)
Financial strategy as additional monthly household income			
Had no problem	132 (59.5)	99 (49.0)	9 (23.1)
Loan/grant from family member(s)	81 (36.5)	94 (46.5)	23 (59.0)
Other	9 (4.1)	9 (4.5)	7 (17.9)
Coping strategy			
Had no problem	138 (56.1)	74 (34.1)	15 (34.9)
Performed physical activities	53 (21.5)	106 (48.8)	15 (34.9)
Performed religious activities	50 (20.3)	27 (12.4)	13 (30.2)
Other	5 (2.0)	10 (4.6)	0 (0.0)

TB indicates tuberculosis.

utility of the HIV population in a single study site. We used the Indonesian language of the EQ-5D-5L questionnaire[10] to identify differences in HRQoL among patients with different medical conditions. Our study was conducted among a sample of patients with HIV and TB, and our population's sociodemographic and health characteristics were similar to those of a population-based Indonesian demographic and health surveillance.[15] Our findings may be generalizable to the wider Indonesian HIV population.

The HRQoL for all participant groups was reported to be relatively high, very similar to the HRQoL of healthy Indonesian general population.[10] One possible reason for this high value of near full health among the study participants was that almost all study participants were in their maintenance period of treatment for HIV, TB, and TB/HIV. Adjustment and acceptance of the illnesses may contribute to the higher HRQoL in all groups.[16] Our study supports previous findings that TB infection lowers the UEQ-5D score in participants with HIV.[17,18] Furthermore, there was no significant association between age and monthly household income with U_{VAS}. This finding is similar to a study conducted in Indonesia in 2020, which postulated that there was no relationship between sociodemographic and HRQoL, and further suggested family support to be the dominant predictor for better HRQoL in patients with HIV.[19] One hundred percent of HIV-infected patients in our study received cART and were among participants whose U_{EQ-5D} were the highest. This finding emphasizes the positive impact of cART delivery in the public sector of the Indonesian healthcare system, which is not only on patient survival but also on HRQL and the ability to function in society.[20,21]

The EQ-5D severity ratings provided by participants may reveal valuable information about which populations should receive higher treatment management priority for HIV and TB. Our findings further highlight the need for specialized care management for patients with TB/HIV. It is important to note that certain participants with TB/HIV experienced severe to excessive difficulty with typical activities, pain, and anxiety, even though more than half of patients with TB/HIV reported no problems with mobility, self-care, typical activities, pain, or anxiety. These results show that patients might benefit from a healthcare strategy that takes into account the whole person rather than just HIV and TB therapies. Symptoms may be reduced, medical treatment tolerance enhanced, and patients' strength restored through care management interventions that

focus on symptom management, psychological therapy, and other aspects of care coordination.[22]

Integrated healthcare with free HIV/TB services has improved HRQoL and saved healthcare costs, particularly by lowering clinic visits.[23,24] All study participants received integrated care—multiple services at the same location on the same day. Patients with TB/HIV had at least 2 "integrated" visits throughout the maintenance and more upon diagnosis when HIV and TB services were provided on the same day.

This analysis found that direct medical OOP expenditures contributed more to total costs than direct nonmedical and indirect costs for all groups. Despite free health treatments, many HIV, TB, and TB/HIV coinfected patients had to pay for additional clinical tests, nutritional supplements, and travel charges for themselves and their caregivers. The Indonesian government has yet to handle OOP medical expenses, especially because many Indonesians have modest household incomes. Unmanageable OOP charges can exacerbate the catastrophic costs of HIV and TB.[25,26] Due to TB/HIV infections, patients and caregivers must pay for travel, extra food and drinks, and other expenses. Our findings contradicts the 2014 Joint United Nations Programme on HIV/AIDS HIV medical cost figures for Indonesia,[27] which may encourage the additional cost studies on patient-focused HIV and TB healthcare cost.

Long-term HIV and TB treatments pose a danger to employment-related finances. A patient's illness prevents him or her from working to support the household's economy. More than half of the research participants continued working, whereas some had to quit. Patients with HIV and TB with severe symptoms (eg, poor nutritional status and exacerbated clinical symptoms) are more likely to deteriorate and lose income.[28,29] Participants in this study adopted physical and religious activities as coping mechanisms to sustain health and a positive attitude. This finding supports results from another study, which stated that physical activities (eg, peer groups and job guidance) may improve and maintain the health status of Vietnamese patients with HIV.[30] In some cases, participants were able to manage the costs of care, for example, by borrowing money from family or acquaintances. However, in the case of exceptionally high healthcare costs or patients lack social capital, this financial strategy may put patients at risk of a greater long-term financial burden. Our research confirms previous findings that the primary drivers of HIV and TB patient expenditures are loss of income and inability to work due to illness.[31]

Our study had a number of limitations. First, operational restrictions prevented random or systematic participant enrolment. Regardless, our participants' sociodemographics were similar to those in a multisite population-based health surveillance system, suggesting they may be representative. Second, given that eligible participants were recruited sequentially, the participant groups we compared had different numbers. TB/HIV had fewer participants than HIV and TB, skewing the results. Third, participants often forgot expensive details such as nutritional supplement prices. Before filling out the structured questionnaire, enumerators and participants verified the price. The EQ-VAS scores and EQ-5D utility reflect different perspectives on HRQoL: EQ-VAS is patient perspectives, how patients feel about their own health overall; EQ-5D utility is more a societal perspective, value attached to an EQ-5D health state (measured by the EQ-5D descriptive system) according to a set of weights that reflect, on average, people's preferences about how good or bad the health state is. The Bland-Altman plot demonstrated a moderate level of agreement between the perceived U_{EQ-5D} and U_{VAS} reported by all participants in the research. For studies using the EQ-5D questionnaires, it is suggested to researchers considers their purpose of collecting EQ-5D data and how the results will be used before they choose to use the EQ-5D utility or the EQ-VAS.[32] Finally, indirect cost components and interpretations varied. To eliminate bias against zero-income persons, the study investigator measured indirect costs using productivity loss.

Conclusion

The moderate agreement between the U_{EQ-5D} and U_{VAS} suggests that high HRQoL values across all groups, as depicted by the Bland-Altman plot, may be associated with extended treatment and coping periods to achieve a higher HRQoL. As part of the national health program (universal health coverage), HIV and TB treatment management in Indonesia still confronts treatment and financial burdens, particularly among patients with TB/HIV. Measures, such as the government's commitment and priority to coinfection, disease mitigation, scaling up investment in therapy, accessibility in visiting healthcare facilities, and individualized disease treatment by physicians, are required to combat the decline of HRQoL, which increases healthcare costs.

Author Disclosures

Links to the individual disclosure forms provided by the authors are available here.

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