Effects of comorbidities on quality of life in Filipino people with tuberculosis

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BACKGROUND: We investigated health-related quality of life (HrQoL) in Filipino people undergoing TB treatment, and whether HrQoL was negatively impacted by comorbidity with undernutrition, diabetes (DM) and anaemia.

METHODS: Adult participants were enrolled in public facilities in Metro Manila (three sites) and Negros Occidental (two sites). Multivariate linear regression was used to model the four correlated domain scores from a WHOQOL-BREF questionnaire (physical, psychological, social, environmental). A forward-stepwise approach was used to select a final multivariable model with inclusion based on global tests of significance at $P < 0.1$.

RESULTS: In 446 people on drug-susceptible TB treatment, DM and moderate/severe anaemia were not associated with HrQoL. After adjustment for age, sex,

education, food insecurity, treatment adherence, inflammation, Category I or II TB treatment, treatment phase, current side effects and inhibited ability to work, moderate/severe undernutrition (body mass index < 17 kg/m²) was associated with lower HrQoL ($P = 0.003$) with reduced psychological (coefficient: –1.02, 95% CI –1.54 to –0.51), physical (–0.62, 95% CI –1.14 to –0.09) and environmental domain scores (–0.45, 95% CI –0.88 to –0.01). In 225 patients with known HIV status in Metro Manila, HIV was associated with modestly reduced HrQoL ($P = 0.014$).

CONCLUSION: Nutritional status and food insecurity represent modifiable risk factors for poor HrQoL that may be alleviated through interventions.

KEY WORDS: tuberculosis; diabetes; malnutrition; comorbidities; the Philippines; quality of life

TUBERCULOSIS (TB) IS A LEADING cause of morbidity in many high-burden countries.[1] Although increasing attention is being paid to the impact of TB beyond physical health, including psychosocial and financial impacts, the effects of common comorbidities such as HIV, diabetes (DM), acute malnutrition and anaemia on the patient's overall well-being is not known.

Understanding how TB impacts on quality of life (QoL) as perceived by individuals, is important for understanding how to improve patient-centred care (a component of Pillar 1 in the End TB Strategy 2035).[2] It is also needed to evaluate interventions and for health policy, since data on health-related QoL (HrQoL) are used in health economic evaluations. HrQoL encompasses the physical, mental and social well-being of individuals. How these are perceived is dependent on the society and environment of

individuals. Studies in a range of settings have reported negative impacts of TB disease on an individual's HrQoL, using an assortment of mostly generic tools applicable to different health conditions. Some of these studies included an appropriate comparison population groups of individuals without TB disease or with latent TB infection or reference population norms.[3,4] Few studies in people with active TB disease have included an assessment of the impact of comorbidities on HrQoL, although a recent prospective cohort study in India reported a negative effect of DM using the TB-specific Dhingra and Rajpal (DR-12) scale.[5]

Although the Philippines has a high TB burden, there are currently limited HrQoL data from the Philippines or on comorbidities in TB. Within a cross-sectional study of Filipino people with active TB disease enrolled in TB-DOTS clinics (ISRCTN12506117), we investi-

gated, as a primary objective, the prevalence of DM and moderate/severe acute undernutrition and factors associated with these comorbidities, reported elsewhere.[6] Here, we report into whether comorbidities of undernutrition, DM and moderate or severe anaemia and HIV infection are associated with reduced HrQoL in this population, as a secondary objective.

METHODS

Study design

This was a cross-sectional survey, described in detail elsewhere.[6]

Study setting

The Philippines is a middle-income country, estimated to have the third highest TB incidence (554/100 000 population) occurring in the context of a low HIV prevalence, estimated at 2% of incident TB cases, although HIV testing is low in many areas.[7] The prevalence of undernutrition (body mass index [BMI] < 18.5 kg/m^2) in Filipino adults was 10% in the 2014 National Nutrition Survey. Three public TB-DOTS clinics in Metro Manila provided data from an urban setting, including the TB-DOTS Clinic at San Lazaro Hospital, an infectious disease referral hospital, serving a predominantly poor population. Metro Manila is identified as a Category 'A' area, with a high burden of HIV compared to other areas of the country. Two public TB-DOTS clinics in Negros Occidental provided data from a rural setting.

Participants

Adults (aged $\geq$18 years, excluding pregnant women) whose TB-DOTS registration date indicated that TB treatment should be ongoing, were eligible to participate. Research nurses visited *barangays* (villages) to attempt to locate all those whose treatment was ongoing.

Outcome

The primary outcome of interest was HrQoL assessed using the World Health Organisation Quality of Life-BREF (WHOQOL-BREF) assessment,[8,9]. Responses to 24 of the 26 items in WHO HrQoL-BREF were used to score four domains: 1) physical, 2) psychological, 3) social relationships, and 4) environment. Domain scores were calculated according to the standard algorithm (with a possible range of 4–20).[9] Higher domain scores reflect better HrQoL.

Data collection and definitions of comorbidity exposures

Trained multilingual research nurses completed all study assessments using questionnaires and tools translated into local languages and extracted information recorded on participant's National TB Program treatment cards. Household food security was assessed using the Adapted US Household Food Security Survey Module (US HFSSM), previously validated for use in the Philippines.[10] Data were entered directly into Open Data Kit software and uploaded to a secure server daily. Research nurses conducted anthropometry measurements;[6] weight to the nearest 0.1 kg; height, mid-upper arm circumference (MUAC) and waist and hip circumferences to the nearest 0.5 cm; and grip strength to the nearest kg (Jamar Hydraulic Hand Dynamometer; Lafayette Instruments, IN, USA) using the highest of three measurements of the dominant hand. Fingerprick blood samples were used to obtain haemoglobin (HemoCue 301; Ängelholm, Sweden), glycosylated haemoglobin (HbA1C) and C-reactive protein (CRP) (Alere Afinion AS100 Analyzer; Abbott Diagnostics, Abbott Park, IL, USA) and to conduct HIV screening (Standard Diagnostics Bioline HIV-1/2 Ag/Ab Combo Rapid Test kits) for those with unknown status and who provided additional consent.

Comorbid conditions considered here included undernutrition, defined as moderate/severe undernutrition (BMI < 17.0 kg/m^2), DM defined as HBA1c $\geq 6.5\%$ or receiving treatment for DM at enrolment, moderate/severe anaemia defined as haemoglobin < 11 g/dL. HIV co-infection was defined as a positive screening test result or a previous diagnosis. Other available data included 1) sociodemographic characteristics: age, sex, urban/rural area study area, marital status, level of education, distance/time to TB-DOTS centre, health insurance, level of household food security, smoking and alcohol consumption and factors relating to impact of TB on ability to work and cover expenses; 2) health and TB related factors: TB category (new vs. relapse etc.), phase of TB treatment (intensive vs. continuation), current side effects of TB treatment, adherence to TB treatment in the previous week, category of medication (Category I or II), presence of inflammation (CRP > 5 g/L) and hand grip strength as a measure of functional nutritional status.

Sample size

Sample size for this study was determined by the main study of undernutrition and DM comorbidity. Of 614 participants with drug-susceptible TB in the main study, 446 completed QoL interviews.

Statistical methods

Data were analysed using Stata v.15.1 (Stata Corp, College Station, TX, USA) and R (R Computing, Vienna, Austria).[11] Characteristics were summarised for all enrolled participants and for those with complete HrQoL data. Physical, psychological, social and environmental domain scores were summarised as mean (standard deviation [SD]), after observing data to be approximately normally distributed.

Due to correlation between QoL domain scores

within individuals, multivariate linear regression was used to simultaneously analyse the four QoL outcomes in the same model. For each independent variable, regardless of the number of categories, global tests of association were conducted for association with the four domains to reduce multiple testing.[12]

Multivariable multivariate linear regression model building was carried out using a forward stepwise approach in blocks of related exposures, where blocks comprised 1) comorbidities, 2) demographic and socioeconomic indicators, and, 3) TB related factors. Variables were retained if the global test of association P value after adjustment for other variables was <0.1. Sex was included *a priori*. In the final adjusted model, the strength of association between the independent variables and QoL domain scores was interpreted with and without Bonferroni's adjustment for the number of tests of association in the final model ($\alpha = 0.05$/number of tests of association [covariates] in the final model).

Ethics

Ethical approval was obtained from Institutional Ethics Review Boards at School of Tropical Medicine and Global Health, Nagasaki University (Nagasaki, Japan), London School of Hygiene & Tropical Medicine (London, UK), Philippines National Ethics Committee (Manila, The Philippines) and San Lazaro Hospital in Manila. Written consent was provided by all participants prior to study enrolment, and additional written consent was obtained for HIV screening in accordance with Department of Health procedures.

RESULTS

Of 614 participants on non-drug-resistant TB regimens enrolled between 8 May and 18 September 2017, 446 were interviewed for HrQoL between 19 May and 18 September 2017. The 446 participant sub-set included in this analysis (hereafter referred to as the study population) were similar to the total study population, except that a greater proportion of those with HrQoL data were enrolled in urban Metro Manila than in rural Negros Occidental (Supplementary Table S1). Males comprised 70% of the study population and the mean age was 44.8 years (SD 16.7). Participants were significantly older in Negros Occidental than in Metro Manila (50.5 vs. 41.1 years; $P < 0.001$), with no difference in age by sex ($P = 0.280$). The proportion of participants with previously treated TB (i.e., those programmatically defined as relapse, treatment after failure, previous treatment outcome unknown or treatment after loss to follow-up) was 30.3% (134/443). There was no evidence that the proportion of previously treated cases differed by urban/rural area or by sex but did

increase with age, from 17.4% in the 18–40 years age group, 40% in the 41–65 years' age group to 45.6% in the >65 years age group ($P < 0.001$). This is relevant, because previously treated cases in this setting were treated with Category II TB treatment including daily injectable streptomycin during the intensive phase of treatment.

The prevalence of DM in the study population was 8.3%, with just over half newly captured by the study protocol (Supplementary Table S1). The prevalence of moderate and severe undernutrition was 19.7%, moderate/severe anaemia was 15.7% and self-reported hypertension was 9.0% (Supplementary Table S1). HIV status was unknown for the majority of participants in Negros Occidental due to screening refusal. In Metro Manila, HIV status was known for 238 (88%) of participants, and 68 (28.6%) were infected. All but 4 had been previously diagnosed, and 54 were on antiretroviral therapy. Most of these participants (63/68) were enrolled at San Lazaro Hospital, an HIV referral centre, accounting for the high proportion of HIV comorbidity in our urban study population.

Data were complete for all items on the WHO-QOL-BREF. Domain scores were approximately normally distributed, although some skew and outliers were noted for the psychological domain (Figure 1). Internal consistency across domain components was good for the physical, psychological and environmental domains (Cronbach's $\alpha > 0.7$), but poor for the social relationships' domain (Cronbach's $\alpha = 0.46$).

For the single (national item) of overall rating of QoL, 98 (22.0%) rated their QoL as poor or very poor, and 160 (35.9%) as good or very good. This compared to 169 (37.9%) who reported being dissatisfied or very dissatisfied with their health and 118 (26.5%) who were satisfied or very satisfied.

Mean domain scores are shown in Tables 1, S2 and S3. In univariable, multivariate analysis there was no evidence of an association between DM, anaemia or reported hypertension with HrQoL domain scores (Table 1). However, moderate/severe undernutrition was significantly associated ($P < 0.001$) with reduced scores for the physical and psychological domains. Similarly, grip strength as a measure of functional nutritional status was positively associated with higher domain scores ($P < 0.001$), while moderate and severe levels of household food insecurity were associated with reduced scores ($P < 0.001$; Supplementary Table S2). For those with known HIV status in Metro Manila, HIV infection was associated with HrQoL domain scores ($P < 0.001$; Table 1), with evidence of increased scores for the physical and environmental domains. We also assessed associations with indicators of the possible impact of TB on ability to work, and consequences for household finances, which both showed evidence of negatively
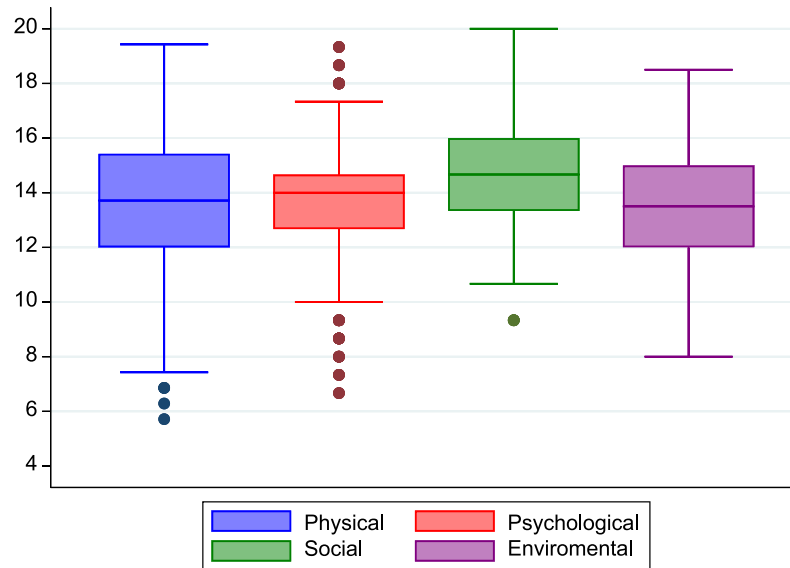
Figure 1 Distribution of health-related quality of life domain scores in persons on drug-susceptible tuberculosis treatment regimens.

affecting HrQoL scores ($P < 0.001$; Supplementary Table S2). Finally, TB-specific factors were assessed, all of which, apart from the basis of diagnosis (bacteriological vs. clinical) were significantly associated (Supplementary Table S3).

Effects for factors retained in the final model are shown in Table 2. The association between HrQoL and undernutrition remained after adjustment for other exposures, with the greatest reduction in the psychological domain. Moderate or severe food

insecurity showed a dose-response effect of decreased scores for all domains (Figure 2A). When considering a Bonferroni adjustment to account for 12 global tests (α of $0.05/12 = 0.004$), undernutrition and household food security remained strongly associated with HrQoL.

When adjusting for area in the model ($P < 0.001$), effects of adherence and undernutrition were reduced (global test $P = 0.078$ and $P = 0.058$), as these differed by area (93% in Negros Occidental adhered fully in

Table 1 Domain scores in 446 persons on drug-susceptible TB treatment regimens by clinical comorbid characteristics

			Health-related quality of life domain, mean (SD)				Global P value
		n	Physical	Psychological	Social	Environmental	
Overall		446	13.4 (2.4)	13.7 (2.2)	14.6 (2.0)	13.3 (2.0)	
Undernutrition	None/mild: BMI < 17 kg/m²	357	13.7 (2.3)	13.8 (2.1)	14.7 (1.9)	13.4 (2.0)	<0.001
	Moderate/severe: BMI ≥ 17 kg/m²	88	12.6 (2.5)	12.9 (2.2)	14.5 (2.3)	13.0 (1.9)	
Anaemia	None/mild: Hb ≥ 11 g/dL	373	13.5 (2.4)	13.8 (2.2)	14.7 (2.0)	13.4 (1.9)	0.182
	Moderate/severe: Hb < 11 g/dL	70	13.0 (2.4)	13.1 (2.2)	14.3 (2.0)	12.9 (2.4)	
Diabetes	No: HbA1c < 6.5%, not on treatment	409	13.5 (2.4)	13.7 (2.2)	14.6 (2.0)	13.3 (2.0)	0.590
	Yes: HbA1c ≥ 6.5% or on treatment	37	13.2 (2.3)	13.6 (2.2)	14.9 (1.8)	13.6 (1.5)	
Diabetes diagnosis	Not diabetic	409	13.5 (2.4)	13.7 (2.2)	14.6 (2.0)	13.3 (2.0)	0.773
	New diagnosis (HbA1c ≥ 6.5%, no previous diagnosis)	19	13.1 (2.2)	13.8 (1.7)	15.2 (1.4)	13.5 (1.6)	
	Existing diagnosis	18	13.4 (2.5)	13.4 (2.6)	14.6 (2.1)	13.6 (1.5)	
Diabetes control	Not diabetic	409	13.5 (2.4)	13.7 (2.2)	14.6 (2.0)	13.3 (2.0)	0.570
	Controlled: on treatment and HbA1c < 8.0%	14	13.9 (2.6)	14.0 (2.4)	14.7 (2.0)	13.6 (1.6)	
	Uncontrolled: HbA1c ≥ 8%	23	12.8 (2.0)	13.4 (2.0)	15.1 (1.7)	13.5 (1.5)	
Self-reported hypertension	No	406	13.5 (2.4)	13.7 (2.2)	14.7 (2.0)	13.4 (2.0)	0.072
	Yes	40	12.4 (2.1)	13.2 (2.0)	14.3 (1.9)	12.7 (1.9)	
Number of comorbidities (undernutrition, anaemia, diabetes, hypertension)	0	262	13.8 (2.4)	14.0 (2.1)	14.8 (1.9)	13.5 (2.0)	0.004
	1	137	13.3 (2.4)	13.3 (2.3)	14.5 (2.2)	13.3 (1.9)	
	2	43	12.1 (1.9)	12.9 (1.9)	14.4 (1.9)	12.6 (1.8)	
	3	4	12.1 (3.8)	12.3 (2.5)	14.7 (1.9)	12.5 (2.0)	
Inflammation	No: C-reactive protein < 5 g/L	369	13.7 (2.4)	13.8 (2.2)	14.7 (2.1)	13.4 (2.0)	0.010
	Yes: C-reactive protein ≥ 5 g/L	34	12.3 (2.6)	12.6 (1.9)	13.7 (1.8)	12.6 (1.8)	
Hand grip strength, kg		445	—	—	—	—	<0.001
HIV infection (Manila only)	No	170	13.5 (2.5)	14.2 (2.1)	14.8 (2.1)	13.1 (2.0)	<0.001
	Yes	68	14.5 (1.7)	14.2 (1.9)	14.8 (1.8)	14.7 (1.5)	

TB = tuberculosis; SD = standard deviation; BMI = body mass index; Hb = haemoglobin; HbA1c = glycosylated haemoglobin; HIV = human immunodeficiency virus.

**Table 2** Multivariable multivariate regression analysis in 392 persons on drug-susceptible TB treatment regimens*

	Health-related quality of life domain, linear regression coefficient (95% CI)				
	Physical	Psychological	Social	Environmental	Global P value†
Sex					
Female					
Male	-0.88 (-1.44 to -0.32)‡	-0.42 (-0.97 to 0.13)	-0.14 (-0.68 to 0.39)	-0.21 (-0.68 to 0.25)	0.039
Age, years					
18–40					
41–65	-0.18 (-0.70 to 0.33)	-0.50 (-1.00 to 0.01)	-0.19 (-0.68 to 0.30)	-0.48 (-0.90 to -0.05)‡	0.073
>65	-0.75 (-1.54 to 0.04)	-0.96 (-1.74 to -0.18)‡	-0.82 (-1.57 to -0.06)‡	-0.48 (-1.14 to 0.18)	
Maximum education obtained					
Primary					
Secondary	0.42 (-0.11 to 0.95)	0.42 (-0.10 to 0.94)	0.24 (-0.26 to 0.75)	0.39 (-0.05 to 0.83)	<0.001
Tertiary	1.01 (0.35 to 1.66)‡	0.40 (-0.24 to 1.04)	-0.10 (-0.72 to 0.52)	1.20 (0.66 to 1.74)‡	
Vocational	0.13 (-1.24 to 1.49)	-0.62 (-1.96 to 0.72)	0.07 (-1.23 to 1.37)	0.49 (-0.64 to 1.62)	
Household food security					
Secure					
Moderate insecurity	-0.66 (-1.20 to -0.12)‡	-0.57 (-1.10 to -0.03)‡	-0.64 (-1.16 to -0.12)‡	-0.93 (-1.38 to -0.48)‡	<0.001
Severe insecurity	-0.78 (-1.35 to -0.22)‡	-0.82 (-1.38 to -0.27)‡	-1.00 (-1.53 to -0.46)‡	-1.25 (-1.71 to -0.78)‡	
Moderate/severe undernutrition§					
No: BMI <17 kg/m²					
Yes: BMI ≥17 kg/m²	-0.62 (-1.14 to -0.09)‡	-1.02 (-1.54 to -0.51)‡	-0.20 (-0.70 to 0.30)	-0.45 (-0.88 to -0.01)‡	0.003
Inflammation					
No: CRP <5 g/L					
Yes: CRP >5 g/L	-0.96 (-1.73 to -0.19)‡	-1.14 (-1.90 to -0.39)‡	-0.97 (-1.71 to -0.24)	-0.90 (-1.54 to -0.27)‡	0.017
Hand grip strength	0.05 (0.02 to 0.08)‡	0.00 (-0.03 to 0.03)	-0.00 (-0.03 to 0.03)	-0.01 (-0.03 to 0.01)	<0.001
Phase of treatment					
Intensive					
Continuation	0.51 (0.06 to 0.97)‡	0.28 (-0.16 to 0.73)	-0.09 (-0.52 to 0.34)	-0.14 (-0.51 to 0.24)	0.025
TB treatment category					
Category 1					
Category 2	-0.65 (-1.11 to -0.19)‡	-0.46 (-0.92 to -0.01)‡	-0.75 (-1.19 to -0.31)‡	-0.22 (-0.60 to 0.17)	0.002
Current treatment side effects					
No					
Yes	0.76 (0.30 to 1.22)‡	0.41 (-0.04 to 0.86)	0.16 (-0.27 to 0.60)	0.41 (0.03 to 0.79)‡	0.026
Ability to work affected					
No					
Yes	-0.48 (-0.91 to -0.05)‡	-0.72 (-1.15 to -0.30)‡	-0.74 (-1.15 to -0.33†)	-0.20 (-0.56 to 0.16)	<0.001
Number of days adherent in last 7 days	0.03 (-0.05 to 0.11)	-0.06 (-0.14 to 0.02)	0.01 (-0.07 to 0.09)	0.10 (0.03 to 0.17)‡	<0.001

* Based on n = 392 after exclusion of missing values (missing values: total = 5; BMI = 1; grip strength = 1; work ability = 2; adherence = 4; CRP = 43).
† From multivariable multivariate linear regression.
‡ Indicates 95% CIs excluding the null effect.
TB = tuberculosis; CI = confidence interval; BMI = body mass index; CRP = C-reactive protein.
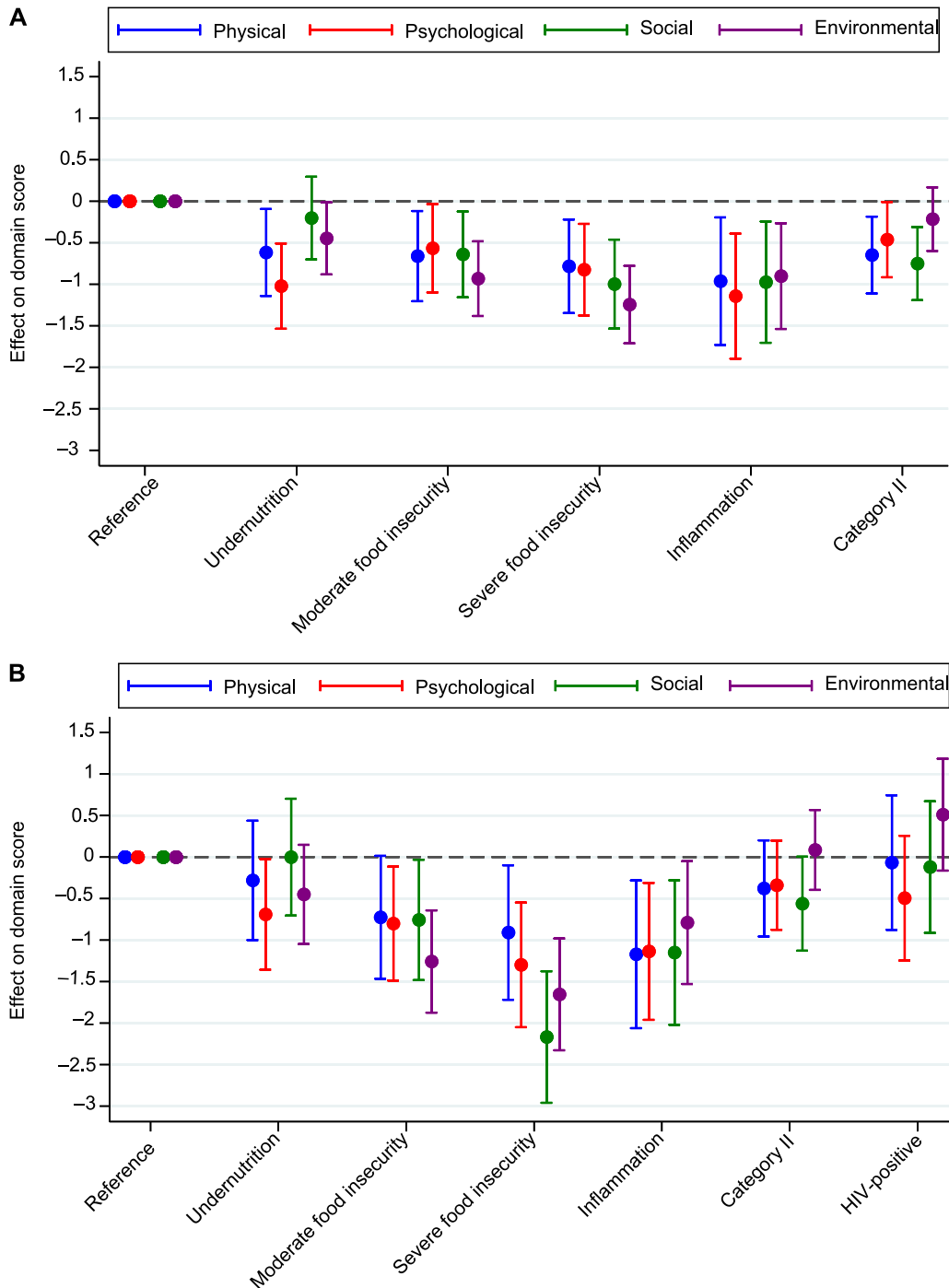
Figure 2 A) Adjusted effects on HrQoL domain scores in persons on drug-susceptible TB treatment regimens; **B)** adjusted effects on HrQoL domain scores in persons on drug-susceptible TB treatment regimens registered in clinics in Metro Manilla with known HIV status. Undernutrition: moderate/severe: BMI $\geq$ 17 kg/m^2 compared to mild/normal: BMI $<$ 17 kg/m^2; moderate and severe household food insecurity compared to mild/no insecurity. Inflammation: CRP $\geq$ 5 g/L compared to CRP $<$ 5 g/L. Category II compared to Category I TB treatment regimen (Category II includes daily streptomycin injections in the intensive phase). HrQoL = health-related quality of life; CRP = C-reactive protein.

the last 7 days compared to 62% in Manila, χ^2 $P <$ 0.001; and 30% vs. 15% severe/moderate undernutrition in Negros Occidental and Manila, $P = 0.002$). Household food security was not associated with undernutrition overall but did differ by area (approximately two thirds moderate/severe food insecurity in Negros compared to one third in Manila, $P < 0.001$).

Undernutrition and recent adherence were retained in the model over area as more specifically measured covariates of interest.

The final model was fitted to participants from Metro Manilla with known HIV status and non-missing values for factors in the final model (Supplementary Table S4). After adjustment, HIV

was associated with QoL overall ($P = 0.014$, Figure 2B) with the largest observed negative impact on psychological domain, followed by environmental domain. In this model, the effects of undernutrition and adherence were absent, but food insecurity remained a strong risk factor for reduced QoL ($P < 0.001$). In this sub-group, HIV was strongly associated with increased level of education ($P < 0.001$), which likely represents a proxy for socio-economic status (60% of those with tertiary education had HIV) and sex (40% of male participants vs. 3% of women had HIV, $P < 0.001$ and the previously observed effect of sex on QoL was not seen in this sub-group).

DISCUSSION

We focussed on the effect of DM and undernutrition on HrQoL as more common comorbid conditions. The prevalence of undernutrition is much higher than in the general adult population (10% BMI < 18.5),[13] while the national prevalence of DM is estimated at 5.8%.[14] Furthermore, diagnosis and management of DM and undernutrition are recommended for integrated patient centred care, but current implementation is limited.[2,15]

In this population, we observed that undernutrition was independently associated with lower perceived QoL in the physical, psychological and environmental domains. No effects were observed for DM or anaemia. Furthermore, we explored if effects of DM may be limited to those with existing diagnoses or those with uncontrolled (HbA1c $\geq$ 8%) compared to controlled DM, but saw no evidence of associations, although low numbers of observations will have limited the probability of detecting all but large effects. In addition to undernutrition, household food insecurity was associated in a dose-response manner with reduced scores across all four domains. In a previous cross-sectional study of HrQoL using the Short Form-8 (a shorter version of the Short Form-36) in 520 Filipino TB patients enrolled in TB-DOTS in Metro Manila, the mental component summary score, but not the physical component summary score, was independently associated with increasing BMI.[16] Although the use of financial or in-kind support for travel or food as incentives or enablers for persons undergoing TB treatment are widely advocated to increase treatment uptake and completion and as means of poverty alleviation,[17] no such programmes were available at the time of our study for patients enrolled in non-MDR-TB treatment regimens. Therefore, we could not investigate if such provisions might impact QoL, and if mediated through effects on nutritional status or household food security. We are not aware of any studies that have assessed this. In India, large increases in WHOQOL-BREF domain scores were observed between start of TB treatment and end of the intensive phase and end of treatment.[18] The mean scores at treatment completion were the most comparable to those we observed (scores transformed onto the 0–100 scale of 66 [environment domain] to 80 [physical domain]), equivalent to approximately 14.5 and 16.5 on the 4–20 scale we report). Over the course of treatment, the largest improvement in QoL was observed for the physical domain (nearly doubled), but comorbidities were not assessed.[18] Another study in India (using the TB-specific Dhingra & Rajpal DR-12 scale), reported decreased scores in the socio-psychological and exercise adaptation domains in persons with DM aged over 50 years; while uncontrolled versus controlled DM was associated with lower scores, but only at the end of TB treatment.[5] Despite a high prevalence of severe undernutrition (23% BMI < 15 kg/m²), a possible effect of this important comorbidity was not reported.[5] Within our sub-set of participants with known HIV status, living with HIV infection initially appeared to be associated with increased QoL domain scores, but after adjustment, this association trended towards decreased scores, likely due to confounding by age and education, which were higher in those with HIV and also positively associated with QoL domain scores, Thus, compared to other studies in Ethiopia the impact of comorbid HIV appeared to be limited.[19,20] As the majority of those living with HIV were already in care at the same site as their TB treatment and receiving antiretroviral therapy, this suggests that in the context of adequate care, the additional impact of comorbid HIV in TB is not necessarily great. The level of impact may vary depending on the extent of integrated management of the two conditions and availability of coping/support mechanisms for HIV care.

Although there is evidence that QoL scores increase with duration of treatment, they may not resolve to pre-disease levels due to the increasingly recognised long-term effects of TB disease, including chronic lung disorders, requiring long-term further management.[21] Simple physical therapy rehabilitation interventions may be beneficial in improving lung function and also QoL, especially in the physical domain.[22]

Potential limitations of this study include the lack of normative data in representative Filipino adults to compare our observations with and low internal consistency across the items in the social relationships' domain, so perhaps more contextual adaptation of the tool is needed. Further limitations include those inherent in cross-sectional studies. However, selection bias was minimised by the inclusion of participants across the range of treatment duration and frequency of attending TB-DOTS clinics. Measurement bias was minimised by trained study nurses assessing nutritional status and screening of DM, rather than relying on routinely collected data, but a

single measurement of HbA1c $\geq$ 6.5% may have resulted in misclassification of DM from temporary glucose dysregulation induced by TB.

CONCLUSION

Evidence of the psychosocial effects of undernutrition, additional to direct biomedical effects on TB treatment outcomes provides further evidence to 1) support the need for nutrition interventions; 2) include additional outcomes such as HrQoL and mental health-related measures to determine impacts of nutrition interventions; and, 3) identify individuals who might benefit from additional psychosocial support. The measurement of household food insecurity within TB programmes may be a sensitive indicator of household poverty and stress, which may be alleviated through social protection mechanisms aimed at the whole household and directly or indirectly improving household food security and potentially HrQoL.

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RÉSUMÉ

CONTEXTE : En raison de la faible quantité des données existantes, nous avons évalué la qualité de vie liée à la santé (HrQoL) des Philippins suivant un traitement antituberculeux ; et si ce dernier était négativement affecté par des comorbidités telles que la malnutrition, le diabète et l'anémie.

MÉTHODES : Les participants adultes ont été recrutés dans des établissements publics du Grand Manille (3 sites) et de Negros occidental (2 sites). Nous avons utilisé une régression linéaire multivariée pour modeler les quatre scores de domaine corrélés du questionnaire WHOQHOL-BREF (physique, psychologique, social, environnemental). La méthode ascendante pas à pas a été utilisée pour choisir un modèle multivarié final avec inclusion basée sur des tests de signification dont $P < 0,1$.

RÉSULTATS : Chez 446 personnes sous traitement contre la tuberculose pharmacosensible, le diabète et l'anémie modérée ou sévère n'ont pas été associés avec la HrQoL. Après pondération de l'âge, du sexe, du niveau d'éducation atteint, de l'insécurité alimentaire, de l'adhésion au traitement, de l'inflammation, de la catégorie de traitement antituberculeux (I ou II), de la phase de traitement, des effets secondaires contemporains au traitement et réduction de la capacité à travailler, la sous-nutrition modérée ou sévère (indice de masse corporelle < 17 kg/m^2) a été associée à une HrQoL plus faible ($P = 0.003$) avec une réduction des scores pour les domaines psychologiques (coefficient $-1,02$; IC 95% $-1,54$ à $0,51$), physiques (coefficient $-0,62$; IC 95% $-1,14$ à $0,09$) et environnementaux (coefficient $-0,45$; IC 95% $0,88$ à $0,01$). Chez 225 patients du Grand Manille dont le statut VIH était connu, la séropositivité a été associé avec une HrQoL modérément réduite ($P = 0.014$).

CONCLUSIONS : Le statut nutritionnel et l'insécurité alimentaire représentent des facteurs de risques évitables vis-à-vis de la HrQoL qui peuvent atténués au travers d'interventions.

RESUMEN

MARCO DE REFERENCIA: Dada la escasez de datos, se investigó la calidad de vida relacionada con la salud (HrQoL) en las personas de Filipinas que recibían tratamiento contra la TB y si una comorbilidad por desnutrición, diabetes o anemia la afectaban de manera negativa.

MÉTODOS: Los adultos participantes se inscribieron en establecimientos públicos en Gran Manila (tres centros) y en Negros Occidental (dos centros). Mediante una regresión lineal multivariante se modelizaron las correlaciones de las puntuaciones de las cuatro dimensiones del cuestionario WHOQOL-BREF (física, psicológica, social y ambiental). Se utilizó un método de regresión escalonada anterógrada a fin de escoger un modelo multivariante final con inclusiones basadas en las pruebas generales de significación con $P < 0,1$.

RESULTADOS: De 446 personas en tratamiento por TB farmacosensible, la presencia de diabetes y anemia moderada o grave no se relacionó con la HrQoL. Tras corregir con respecto a la edad, el sexo, el grado de instrucción, la inseguridad alimentaria, el cumplimiento terapéutico, la inflamación, la Categoría I o II del tratamiento antituberculoso, la fase del tratamiento, los efectos secundarios actuales y la alteración de la capacidad de trabajar, se observó que la desnutrición moderada o grave (índice de masa corporal <17 kg/m^2) se relacionaba con una HrQoL inferior ($P = 0,003$), con disminución de la puntuación de la esfera psicológica (coeficiente $-1,02$; IC 95% $-1,5$ a $0,51$), física ($-0,62$; $-1,14$ a $0,09$) y ambiental ($-0,45$; $-0,88$ a $0,01$). De 225 pacientes con situación conocida frente al virus de la inmunodeficiencia humana (VIH) en Gran Manila, la infección por el VIH se asoció con una leve disminución de la HrQoL ($P = 0,014$).

CONCLUSIÓN: El estado nutricional y la inseguridad alimentaria representan factores de riesgo modificables de una HrQoL deficiente, que se pueden mejorar con las intervenciones.