International Journal of Infectious Diseases 32 (2015) 68–75

Contents lists available at ScienceDirect

International Journal of Infectious Diseases

journal homepage: www.elsevier.com/locate/ijid

Review

# Health status and quality of life in tuberculosis

James Brown [a,*], Santino Capocci [a], Colette Smith [b], Steve Morris [c], Ibrahim Abubakar [d], Marc Lipman [a]

[a] Centre for Respiratory Medicine, Royal Free London NHS Foundation Trust, London, and Division of Medicine, University College London, Pond Street, London NW3 2QG, UK
[b] Research Department of Infection and Population Health, University College London, London, UK
[c] Department of Applied Health Research, University College London, London, UK
[d] Research Department of Infection and Population Health, University College London, London, and Medical Research Council Clinical Trials Unit, London, UK

ARTICLE INFO

*Article history:*
Received 17 November 2014
Received in revised form 22 December 2014
Accepted 22 December 2014

*Keywords:*
Tuberculosis
Quality of life
Health status
Health economics
Measures of health

SUMMARY

Tuberculosis (TB) is a leading cause of global morbidity, yet there is limited information regarding its impact on quality of life and health status. This is surprising given the implications for patient care, the evaluation of novel treatments or preventative strategies, and also health policy. Furthermore, there is no validated TB-specific instrument that measures health status, and thus a wide and non-standardized range of assessment tools have been employed. The studies to date have chosen a number of different comparator populations, and in many TB endemic areas there is a lack of normative data regarding the health status of the general population. Systematic evaluations of quality of life are urgently needed in specific groups, including those with extrapulmonary TB, drug-resistant disease, HIV co-infection, and latent TB infection, and in children with TB; the assessment of post-treatment disability is also required.


## 1. Introduction

The suffering caused by tuberculosis (TB) has been acknowledged for millennia,[1] though the systematic evaluation of health-related quality of life (HRQOL) is a much more recent development.[2] TB is a leading cause of morbidity in many regions, and as such an understanding of its effect on quality of life and health status is important for patient care, the evaluation of novel treatments or preventative strategies, and also for health policy, as data on quality of life are used within health economic evaluations. Several difficulties arise when assessing quality of life in TB: there is no validated TB-specific instrument that measures health status, and there are difficulties in choosing appropriate comparator populations and a lack of normative data on health status for the general population in many TB endemic areas. Furthermore, there are few systematic evaluations of quality of life in specific groups, such as those with extrapulmonary TB, drug-resistant disease, HIV co-infection, and latent TB infection (LTBI), or in children with TB. These make 'health status' summaries in TB difficult, probably inaccurate, and can undermine the validity of cost-effectiveness studies of TB management.

Impairment in HRQOL is a complex construct of influences including physical, mental, and social well-being[3] – thus illness is experienced by individuals, yet cannot be understood independently of the societies in which people live.[4] Although a biological definition of TB infection (i.e., latent TB) or disease (active TB) may be universal, it is not possible to produce a single numerical value that summarizes the impact of TB on an individual. It is not surprising, therefore, that quantitative studies have reported a wide range of values for the health impairment associated with TB before, during, and after treatment.[5] In this review we will summarize the evidence regarding quality of life in TB, highlight areas where there is limited information available, and discuss its importance in relation to health economic evaluations.

## 2. Instruments used to measure health-related quality of life in TB

Evaluations of HRQOL can utilize generic tools applicable to many conditions, or specific measures designed to evaluate a particular disease or organ system. Both strategies have advantages, and a combination of generic and specific tools is often helpful.

* Corresponding author. Tel.: +44 207 317 7561.
*E-mail address:* james.brown.14@ucl.ac.uk (J. Brown).

http://dx.doi.org/10.1016/j.ijid.2014.12.045

Many different instruments have been used to evaluate HRQOL in TB, though none are designed specifically for TB (Table 1).

The choice of population against which to compare the HRQOL in those with TB is important. TB often preferentially affects disadvantaged groups or particular ethnic minorities, and hence comparisons of HRQOL with those in the general population may be misleading. An ideal comparator group would be identical in all respects, other than the absence of TB. Those with LTBI represent an attractive group for such comparisons, as they are likely to have similar backgrounds and hence cultural understanding of illness, in particular TB, and by definition do not have symptoms of active disease. However a diagnosis of LTBI may itself be associated with a reduction in health status caused by anxiety or stigmatization, or the adverse effects of medication.[6]

## 3. Quality of evidence about quality of life in TB

Systematic reviews by Chang et al.,[7] Guo et al.,[8] and Bauer et al.[5] provide an appraisal of the available evidence regarding quality of life in those with TB. The most recent of these (which contains a literature search up to April 2011) evaluates 38 articles describing 28 unique study cohorts comprising 6028 patients. However, assessment of the quality of the primary studies suggests that significant risks of bias may be present. In addition, the psychometric properties of the instruments used are often not

**Table 1**
Instruments used to assess quality of life in TB

| Name of instrument | Comments |
|---|---|
| *General quality of life instruments* | |
| Brief Disability Questionnaire (BDQ) | 11-item scale; higher scores indicate worse HRQOL |
| Duke Health Profile (DUKE) | 63 items evaluating symptoms and physical, social, and emotional function; higher scores indicate better HRQOL |
| Dysfunctional Analysis Questionnaire (DAQ) | 50 items evaluating social, vocational, personal, familial, and cognitive domains; higher scores indicate worse HRQOL |
| Euro-QoL (EQ 5D) | 5 domains each ranked with a 3-point scale; higher scores indicate better HRQOL |
| General Health Questionnaire 12 (GHQ 12) | Modified version of the General Health Questionnaire 60. Each item ranked with a 4-point Likert scale; higher scores indicate worse HRQOL |
| Health Utilities Index 2 (HUI 2) | 7 items, each with 3 to 5 levels, used to calculate overall health utility function from 0 (death) to 1 (perfect health) |
| Health Utilities Index 3 (HUI 3) | 8 items, each with 5 to 6 levels, used to calculate overall health utility function from 0 (death) to 1 (perfect health) |
| Life Satisfaction Index Z | 13 items, total scores range from 0 to 26, with higher scores indicating better HRQOL |
| Present State Examination (PSE) | Combined general health questionnaire and self-rating depression scale; higher scores indicate worse HRQOL |
| SF-36 Health Survey (SF-36) | 36 items covering physical and mental wellbeing. Scores from 0–100, with higher scores indicating greater HRQOL |
| SF-12 Health Survey | Abbreviated form of the SF-36 |
| SF-6D utility score | 11-item measure of health status. Scores range from 0 to 1.0, with higher scores indicating better HRQOL |
| Sheehan Disability Scale (SDS) | 20 items evaluating work, family, and social lives. Scores from 0 to 30; higher scores indicate worse HRQOL |
| Sickness Impact Profile (SIP) | 136 items evaluating personal and social impact of illness; a score of >10 indicates severe dysfunction |
| Severe Respiratory Insufficiency Questionnaire (SRI) | 49 items ranked with a 5-point Likert scale evaluating respiratory complaints and associated physical and social limitations; higher scores indicate better HRQOL |
| Standard Gamble | Subjects chose between a given health state and an imaginary gamble between possible outcomes of perfect health and death; results are used to calculate a HRQOL score ranging from 0 to 1, with higher scores indicating better HRQOL |
| Symptoms Check List (SCL-90) | 90 items in 9 domains used to calculate three global indices of global severity index, positive symptom total, and positive symptom distress index; higher scores indicate worse HRQOL |
| Visual Analogue Scale (VAS) | Subjects mark on a scale where they rate their own health, either using a 10-cm scale (0 cm = death, 10 cm = perfect health) or a 100-cm 'feeling thermometer' |
| World Health Organization's Quality of Life–BREF (WHOQOL-BREF) | 26 items comprising 5 domains (physical health, psychological health, social relationships, environment) ranked on a 5-point Likert scale; higher scores indicate better HRQOL |
| *Instruments assessing psychological morbidity* | |
| Beck Depression Inventory (BDI) | 21-item questionnaire designed to evaluate depression; higher scores indicate more severe depression, with a cut-off of ≥13 used to indicate depression |
| Beck Depression Inventory (BDI Short Form) | 13-item questionnaire evaluating the presence of depression; overall score 0–3 = none or minimal depression, 4– 7 = mild depression, 8–15 = moderate depression, ≥16 = severe depression |
| Hospital Anxiety and Depression Scale (HAD) | 14 items evaluating anxiety and depression; higher scores indicate more anxiety/depression |
| Rosenberg Self-Esteem Scale (RSE) | 10 items each with a 4-point scale evaluating self-esteem |
| Mood Adjective Check List Short Form (MACL) | 38 items evaluating three psychological domains (pleasantness, activation, calmness) |
| Self-Rating Anxiety Scale (SAS) | 20 items with a 4-point Likert scale evaluating anxiety; higher scores indicate worse HRQOL |
| Centre for Epidemiologic Studies Depression Scale (CES-D) | 15 items each with a 4-point Likert scale; higher scores indicate more severe depression |
| Kessler 10 | 10 items assessing psychological distress, each with a 5-point Likert scale; higher scores indicate better HRQOL |
| State-Trait Anxiety Inventory Short Form (STAI-6) | 6 items with a 4-point scale used to evaluate anxiety |
| *Disease or system-specific instruments* | |
| St. George Respiratory Questionnaire Short Form (SGRQ) | 50 items in 3 domains (symptoms, activity, and impacts) specific to respiratory illnesses and originally developed to assess patients with airways disease |
| World Health Organization's Quality of Life – HIV (WHOQOL-HIV) | Modified version of the WHOQOL-100 used for patients with HIV; higher scores indicate better HRQOL |
| DR-12 | TB-specific quality of life score with 12 items each ranked on a scale of 1–3; higher scores indicate better HRQOL |
| MOS-HIV | 35-item questionnaire validated to assess quality of life in HIV-infected individuals |

HRQOL, health-related quality of life.