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Validation of the WeDQoL-Goals-Thailand Measure: Culture-Specific Individualised Quality of Life

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Abstract The aim of this study was to validate an individualised measure of quality of life (WeDQoL-Goals-Thailand). Three hundred and sixty-nine Thai people completed the WeDQoL by interview. Respondents rated (0–2) the perceived necessity for wellbeing of 51 goals (goal necessity), then rated (0–3) their satisfaction with the same goals (goal satisfaction). Weighted goal attainment (possible range 0–6) was computed (necessity x satisfaction). Psychometric validation used frequency distributions, Principal Components Analysis (PCA), and Cronbach's alpha. Analysis of variance, *t*-tests, Kruskal–Wallis, Mann–Whitney *U*, Spearman's correlation and multiple regression explored socio-demographic, geographic and economic differences. Respondents were aged 15–89 (mean 45.7, SD 18.0); 169 men, 200 women. For weighted goal attainment scores, PCA found a 44-item scale ($\alpha = 0.91$) and three subscales (*community/social/health*, $\alpha = 0.90$; *house and home*, $\alpha = 0.80$; *nuclear family*, $\alpha = 0.81$). *Thai Individualised Goal Attainment* (*TIGA*) scale and the three subscales were computed as the mean of contributing weighted goal attainment scores, after excluding goals considered 'not necessary' to each individual. Unweighted and individualised scores differed significantly with socio-demographic, geographic and economic indicators. In multiple regression, both *Thai Unweighted Goal Satisfaction* (*TUGS*)

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and *TIGA* scale scores were predicted by being married, living in the South and in a non-urban location. *TIGA* scores were also predicted by being over 25 years old. WeDQoL-Goals-Thailand has excellent psychometric properties. Individualised scores reflect each person's perspective on wellbeing and are sensitive to subgroup differences. However, unweighted satisfaction scores give a broadly similar picture and involve less complex computation.

Keywords Wellbeing · Quality of life · Questionnaire · Validation · Thailand · Developing countries

1 Introduction

The term 'quality of life' is much used but is hard to define. It is increasingly used in the discourses of international development and particularly in debates over how to understand poverty in developing countries (Sen and Nussbaum 1993). The term is interpreted and operationalised variously in a wide range of academic and practitioner spheres, often without definition, with the conceptualisation implicit in the measurement tools used (Galloway 2005). Most commonly used methods of measuring quality of life ask people to indicate their level of agreement with a number of questionnaire items, generated either in that country or in a different culture, often in the developed world. A notable exception is the WHOQOL (World Health Organisation (WHO) Quality of Life Assessment Group 1998), developed as a result of international collaboration and available in several languages. It assesses quality of life perceptions in a particular culture, personal goals, standards and concerns, comprising country-specific items as well as core items. In scoring the WHOQOL, however, as in most other measures, the parsimony of the measure is maintained by assuming that all the questionnaire items are relevant to and of equal value to all individual respondents (Trauer and Mackinnon 2001). This is the case even when importance ratings are used for the WHOQOL-100, although these provide interesting information in their own right (Skevington et al. 2004).

The Patient Generated Index (PGI) (Ruta et al. 1994) and the interview-based Schedule for the Evaluation of Individual Quality of Life (SEIQoL) (McGee et al. 1991) were developed to overcome this limitation, by asking individuals which aspects of life contribute to their quality of life and then asking them to rate each aspect of their own life. Each provides an individualised measure of quality of life, the former being one that assesses the extent to which patients' expectations are matched by reality (discrepancy) and the second providing a total quality of life score weighted by importance of patient-defined domains of life, using a multiplicative method. Such methods are rather more time-consuming to complete than are questionnaire measures and methods such as the SEIQoL tend to require dedicated training for the interviewers.

Quality of life questionnaires that take into account individual values build upon these ideas, but instead of asking people to generate their own quality of life domains during interview, they provide respondents with a number of aspects of life already identified as relevant to a particular population. Researchers in Toronto (Renwick et al. 1996), for example, echo the thinking of Sen (1990) by conceptualising quality of life as "The degree to which a person enjoys the important possibilities of his or her life". This definition informed the design and scoring of their Quality of Life Profile, in which people rate the importance of a number of life domains, then rate their satisfaction with each. Satisfaction scores are multiplied by importance ratings when computing subscale scores (Renwick and Myerscough 2007).

Recent years have also seen the development and psychometric validation of several disease-specific measures of quality of life for a range of health conditions. Of particular relevance are four individualised, disease-specific measures of the impact of diabetes, diabetic retinopathy, age-related macular degeneration and underactive thyroid on quality of life: the ADDQoL (Bradley et al. 1999), RetDQoL (Woodcock et al. 2004), MacDQoL (Mitchell et al. 2005) and ThyDQoL (McMillan et al. 2004) respectively. Each uses the philosophy underpinning the PGI (Ruta et al. 1994) and particularly the SEIQoL (McGee et al. 1991) to create a questionnaire comprising items that address specific aspects of life previously found in interviews to be important to people with that health condition. Each item has two parts: the first asks about the effect of the health condition on the aspect of life (impact rating) and the second asks about the importance of that aspect of life to the individual's quality of life (importance rating). Some have 'not applicable' options. These disease-specific questionnaires have some items in common, but have certain items unique to the particular health condition. The impact rating of each item is multiplied by its importance rating to provide a weighted impact score. All weighted scores applicable to the individual are averaged, yielding an 'average weighted impact' score, which excludes aspects of life each person considered 'not applicable'. Whilst the overall impact of the disease on quality of life according to this score is typically negative, it is also possible for some patients to perceive that their disease has improved particular aspects of life (e.g. family life).

One challenge for the Wellbeing in Developing Countries (WeD) research programme has been to develop a way of studying quality of life that is oriented not towards a specific disease or a more general notion of health, but which explores the social and cultural construction of people's wellbeing in developing countries. This has involved finding a way of measuring quantitatively the subjective quality of life of people living in four countries, in different stages of economic development and modernisation (Thailand, Ethiopia, Bangladesh and Peru) and if possible to compare them (see McGregor (2007) for details of WeD conceptual framework and methodology). Subjective quality of life or QoL is defined in the WeD programme as "The outcome of the gap between people's goals and perceived resources (including their capacity to meet the demands of their environment), in the context of their culture, values, and experiences of un/happiness". This builds on the definition drafted by the WHOQOL group (1995) and highlights the interplay between people's own conceptions of their goals and their satisfaction with achievements, given their material and social circumstances. The term wellbeing is then used in a broader sense and is seen as arising from the interplay of the material circumstances that confront a person and the meanings and values that arise from the relationships that they experience in their particular society and culture. From this perspective, wellbeing is understood as a state that transcends the objective and subjective divide and arises from a combination of what people have, what they can do and their subjective perceptions of what they have and can do (McGregor 2007). The WeDQoL questionnaires were developed with the aim of obtaining scores reflecting not only the general perspective of people in each country, but also capturing the priorities of each individual completing the measure, thus taking account of their particular geographical and societal position. To this end, a questionnaire with a common format, but with items reflecting the quality of life priorities of people in the particular country was developed. This report describes the psychometric validation of the first section of the measure developed and administered in Thailand: WeDQoL-Goals-Thailand. It is particularly appropriate that this exploration of Quality of Life focuses on Thailand, since the concept now features not only in key official development policy documents, published by Thailand's National Economic and Social Development Board (1999), but is also prominent in international debates over the development dilemmas of contemporary Thailand (Thailand Human Development Report 2007).

2 Methods

2.1 The WeDQoL-Goals-Thailand

The item content of the WeDQoL-Goals-Thailand (Table 1) came from two sources: firstly, two scales measuring goal necessity and attainment developed by Yamomoto and colleagues from the WeD research centre in Peru (Yamamoto et al. 2008), which have been used in other WeD countries, and secondly, interviews conducted in November to December 2004, in which 102 informants from rural and urban communities in Thailand were asked questions such as "Describe a time when you felt very happy, giving reasons" and their responses were explored (Jongudomkarn and Camfield 2006; Camfield 2006).

In the first section of the questionnaire, respondents are asked: "What things do you think are necessary to make you happy?", followed by 51 'goals' for wellbeing, which the respondent rates not necessary (coded 0), necessary (1) or very necessary (2). Then follows 51 'goal satisfaction' items, in which respondents are asked to rate their satisfaction with the same 51 goals: 0 (do not have), 1 (not satisfied), 2 (medium satisfied), 3 (satisfied). Of the 51 items, 38 are found also in questionnaires developed for other countries in the WeD project; 31 of these 38 have been designated 'core' items (prefix 'c'), as they were presented in all four WeD countries. Thirteen items are specific to Thailand and the remaining seven appear in a subset of WeD countries including Thailand. All these twenty have the prefix 't' (Table 1).

2.2 Procedure

In August 2005, participants were recruited to complete the WeDQoL-Goals-Thailand at seven sites: four in Northeast and three in Southern Thailand. Of these, three sites (Ban Dong, Ban Tha, Ban Thung Nam) were in rural locations, two were peri-urban (Ban Lao, Ban Chaikao) and two urban (Nai Muang, Klai Talaad). Approximately equal numbers of male and female participants were sampled in three age-bands (15–30, 31–59, and 60+), using lists prepared from the WeD Resources and Needs Questionnaire (RANQ) (McGregor et al. 2007). Whilst every participant in WeDQoL belonged to a RANQ surveyed 'household', and was not at that point working in another area, the survey did include households living in rudimentary and squatted accommodation, to avoid bias towards more affluent households. The Satisfaction With Life Scale (SWLS) (Diener et al. 1985) was included to determine convergent validity. Being a generic measure, this 5-item scale does not cover specific aspects of life known to be important to Thai people. The SWLS was translated into Thai and back-translated and the response options were changed, with the permission of the author, from seven to three options, for ease of completion at interview. In addition, participants answered demographic questions, which enabled them to be linked to household survey data collected by RANQ 6–15 months previously covering their perceived resources and needs satisfaction. The RANQ data was used to compute three scores: the Asset Index (Clarke 2006) (which differentiates between households with 'basic' or 'luxury' household goods, jewellery, kitchen appliances, and electrical consumer goods); a Needs Deprivation Index (McGregor et al. 2007) which is a measure of needs deprivation with higher scores indicating greater deprivation; and a Household Resources Score (McGregor et al. 2007) which indicates the degree of command that a household has over resources across five resource categories (material, human, social, cultural and natural), higher scores indicating greater command. All WeDQoL questionnaires were administered by Thai-speaking interviewers, previously trained by the WeD team

Table 1 The 44 items retained in the WeDQoL-Goals-Thailand

Item number	Item name	Full tem wording
c1	Celebrations	Attending celebrations and activities within the community
c2	Clothes	Having clothes
c3	Faith	Keeping your faith and practising your religion
c4	Food	Having sufficient food everyday
c5	Education children	Education for your children
c6	Knowledge and education self	Knowledge and education for yourself
c7a	Electricity	Having electricity
c7b	Sanitation	Having sewage system
c7c	Water	Having water
c8	Friendship	Having friends
c9	Family relations	Good family relationships
c10	Neighbour relations	Good relationship with your neighbours and other community members
c11	Children	Having children
c12	Health	Good health
c13	Basic household goods	Having basic household goods like pots, plates
c14	Improving community	Improving the community
c16	Own vehicle	Having a vehicle of your own
c17	Participate neighbourhood	Participating in neighbourhood activities
c19	Personal progress	Personal progress, coming out ahead
c20	Public transport	Public transport
c21	Room or house	Having a room or house to live in
c22	Own business/shop	Being able to own a business, a shop, to buy and sell your products
c23	Recognised in community	Being recognised as a community member
c24	Behaving well	Behaving well
c25	Recreational space	Having public spaces for recreation (e.g. park, stadium)
c26	Living environment	Living in a clean and beautiful environment
c27	Teach others	Transferring what you know to others
c28	Community peace	Peace in your community, without delinquency
t1	Partner	Partner
t2	Telephone	Having a telephone
t3	Healthcare access	Accessibility of health care/services
t5	Accessories	Having accessories
t6	Convenience goods	Having convenience goods (e.g. television, fan)
t7	Provide for family	Being able to provide for your family
t8	Travel for pleasure	Being able to travel to other places for pleasure
t10	Family occasions	Family members are able to come together for special occasions
t11	Community groups compatible	Groups in your community are compatible, without conflict/ political violence
t12	Beautiful house	Having a beautiful house
t13	Small no. children	Having a small number of children
t15	Metta-karuna	Having metta-karuna[a] for others

Table 1 continued

Item number	Item name	Full tem wording
t16	Well-behaved children	Well-behaved children
t17	Satisfied with what have	Satisfied with what you have
t18	Wise spending	Spending money wisely
t19	Spacious house	Having a spacious house

c prefix denotes core items appearing in WeDQoL in other countries

t prefix denotes Thailand-specific items/included only in subset of WeD countries

Excluded items: c15, marriage; c18, position of authority; c29, job; t4, host celebrations; t9, free of debt; t14, work for food; t20, professional title

[a] Sanskrit term meaning 'loving-kindness' (important practise for adherents of majority Buddhist religion)

according to a strict protocol. Training included grounding and piloting in the Northeast and South in an adjacent village and urban community, followed by a meeting at which questionnaire administration was standardised before data collection.

2.3 Analysis

All data handling and statistical analysis used SPSS for Windows 12.0. Demographic characteristics were summarised. The distribution of item scores and frequency of missing data for goal necessity and goal satisfaction items were examined. Interviewer feedback revealed any items needing additional explanation or found confusing to a significant proportion of respondents. Such items were removed from subsequent analyses. The goal score for each item was multiplied by the goal satisfaction score to create a *weighted goal attainment* score (possible range 0–6) and their frequency distributions were examined.

Analyses then followed broadly the same sequence for goal necessity scores, goal satisfaction scores and weighted goal attainment scores. Exploratory factor analysis was conducted using Principal Components Analysis (PCA), using the correlation matrix with varimax rotation, which seeks to identify components least correlated or overlapping with each other. First of all, the PCA sought components with Eigenvalues greater than 1 (>1). Then, a forced single factor solution was obtained. This was followed by analysis seeking two factors, then three factors, and so on, up to six factors. Each solution was examined to identify the component or components onto which each item loaded >0.3, as well as identifying the component onto which each item loaded most strongly. These five solutions (with 2–6 components) were all examined to determine which provided a structure with fewest multiple loadings (an item loading >0.3 on more than one component) and having most, if not all, items loading onto one of the components >0.3. Importantly, the meaning of the items loading onto each component was examined to determine whether they were a coherent grouping, and therefore might be considered to be measuring a single underlying construct. Such groupings were discussed with researchers familiar with Thai culture, to determine the extent to which the groupings suggested by the data reflected ways in which people in Thailand had described their lives in qualitative interviews conducted 8 months previously.

Corrected item-total correlations (each item correlated with the sum of the remaining items) and Cronbach's alpha were used to determine the internal consistency reliability of the scales and subscales identified in the PCAs. Alpha >0.7 is usually considered

acceptable (Kline 1993). Item-total correlations (each item correlated with the sum of the remaining items in the scale) and alpha with each item removed were examined to identify any items not contributing well to the scale, indicated by a relatively poor item-total correlation and a substantially increased alpha if that item was removed.

The single scale score and subscales were computed for *Thai Unweighted Goal Satisfaction* (*TUGS*), by taking the mean of the items contributing to the scale or subscale, as indicated by PCA. The next stage of individualisation was to multiply necessity by satisfaction (weighted goal attainment), but if weighted scale and subscale scores were to be computed from the average of the weighted item scores, such scores would be confounded by the fact that 'not necessary' (necessity score 0) but satisfactorily achieved goals (satisfaction score 1–3), as well as 'necessary' or 'very necessary' goals (necessity score 1 or 2) that were not achieved at all (satisfaction score 0) were both computed as zero. Therefore, in the second stage of individualization, weighted goal satisfaction scores rated as 'not necessary' for wellbeing were recoded to be 'not applicable'. Then, *Thai Individualised Goal Attainment* (*TIGA*) scale and subscale scores were computed as the mean of only those items applicable to that individual. Thus, an aspect of life considered 'not necessary' does *not* contribute to his/her individualised scores. This is entirely logical—its presence or absence is irrelevant to that person's quality of life—and the scoring is in keeping with the notion that the list of items in the measure serves as a 'menu' from which the individual selects aspects of life s/he considers necessary to their quality of life. On the other hand, an aspect of life considered 'necessary' or 'very necessary', but which is not achieved will be represented by a zero score, which will then reduce any scale or subscale score to which it contributes. The distributions of the individualised scale and subscale scores were examined. To check the implications of coding necessity ratings 0–2 before weighting (resulting in some zero scores) a linear transformation was conducted in which necessity was recoded 1–3 for each item. A forced single factor solution was conducted and the resulting loadings were correlated with the factor loadings from the single factor solution on the original weighted scores (when necessity was coded 0–3). A correlation close to 1 (perfect) would indicate that the numerical coding which created zeros made little difference to the factor structure.

The *Thai Unweighted Goal Satisfaction* (*TUGS*) scale score, computed as the mean of all 44 satisfaction items, was correlated against the *Thai Individualised Goal Attainment* (*TIGA*) scale score. A perfect positive correlation would indicate that the weighting process and the exclusion of items not considered necessary for an individual's wellbeing does not influence their overall score. In this case, weighting would not be needed to capture the individual perspective on life. However, a less-than-perfect correlation would indicate that allowing people to express how they see the quality of their own life through weighting and by excluding aspects of life considered by them to be unnecessary does indeed yield scores with a more personal perspective. The *Thai Unweighted Goal Satisfaction* (*TUGS*) and *Individualised Goal Attainment* (*TIGA*) scale scores were also correlated against a scale score generated from the mean of weighted scores based on coding necessity 0–2 *without* excluding unnecessary items (weighted goal attainment). This would provide an indication of the extent to which the elimination of 'unnecessary' items influenced the overall quality of life score. A correlation was conducted between the TIGA scale score and the scale score computed from the 44 items coded 1–3 (to check that the coding system had not distorted the findings).

The distribution of each scale and subscale was checked and subscales with a skewness statistic greater than twice its standard error were considered to be non-normally distributed in which case non-parametric statistics were used. *TUGS* and *TIGA* scale and subscale scores were examined according to socio-demographic, geographic and economic variables, using

independent samples *t*-tests for two subgroups (such as gender) (Mann–Whitney *U* for non-normal subscales) and one-way analysis of variance for three or more subgroups (such as marital status) (Kruskal–Wallis for non-normal subscales), followed by post hoc Tukey HSD tests (Mann–Whitney *U* for non-normal subscales). The economic measures were: the Asset Index (categories *poor* (quintiles 1 and 2) and *non-poor* (quintiles 3–5)), compared by *t*-test/Mann–Whitney; the Needs Deprivation Index ($n = 219$) and Household Resources Score ($n = 211$), each correlated with *TUGS* and *TIGA* scale and subscale scores using Spearman's rank correlation. Within each analysis block, there were four tests (scale and three subscales). Therefore, a probability level of $p < 0.01$ (2-tailed) was accepted (Bonferroni correction). Multiple linear regressions used demographic, geographic and economic variables to predict *TUGS* and *TIGA* scale scores and the most parsimonious model was identified.

3 Results

3.1 Demographic Characteristics

The 369 respondents were 184 in Northeast and 185 in Southern Thailand, age range 15–89 (mean 45.73, SD 17.99); 169 men and 200 women.

3.2 Item Reduction

Of the 51 items, seven were excluded from statistical analyses, because interviewer feedback indicated that they were either poorly understood by some respondents or were confused with other items covering a similar topic area. For example, the *work for food* item may have resulted in different understandings, according to the type of location (rural, peri-urban or urban); the *marriage* item was excluded because most life partnerships in Thailand are not understood as 'marriages', but blessed 'partnerships', covered by an item appearing later in the questionnaire. Subsequent analysis included the remaining 44 items (Table 1).

3.3 Thai Goal Necessity Scores

Table 2 provides goal necessity item frequencies. The only item considered either 'necessary' or 'very necessary' by everyone was *water*. There was no consensus regarding the perceived necessity of any item, indicating that weighting by perceived necessity will alter the distribution of scores, rather than simply inflate them all equally. It may be argued that those living in more affluent situations might underestimate the importance of basic necessities because they take them for granted, but careful examination of the socio-demographic characteristics of the few people who thought food, electricity and sanitation unnecessary for happiness showed that there was no pattern—they included a mix of regions, sites, site types (rural, peri-urban and urban), wealth status, gender and age.

3.4 Thai Goal Satisfaction Scores

Table 3 provides the frequency distributions for the 44 goal satisfaction items. Everyone had *basic household goods* and *a room or house*, even if they were not satisfied with it. Although 266 (72.1%) were satisfied with *having food*, only 208 (56.4%) were satisfied with their *water*. Areas in which a relatively low proportion of the sample reported maximum satisfaction were *public transport* and *recreational space*.

Table 2 Thai goal necessity item responses (44 items) $n = 369$

Item number	Item name	Necessity rating frequencies (%)		
		Not necessary	Necessary	Very necessary
c1	Celebrations	32 (8.7%)	225 (61.0%)	112 (30.4%)
c2	Clothes	21 (5.7%)	164 (44.4%)	184 (49.9%)
c3	Faith	2 (0.5%)	132 (35.8%)	235 (63.7%)
c4	Food	3 (0.8%)	47 (12.7%)	319 (86.4%)
c5	Education children	9 (2.4%)	69 (18.7%)	291 (78.9%)
c6	Knowledge and education self	21 (5.7%)	145 (39.3%)	203 (55.0%)
c7a	Electricity	2 (0.5%)	64 (17.3%)	303 (82.1%)
c7b	Sanitation	27 (7.3%)	147 (39.8%)	195 (52.8%)
c7c	Water	0 (0%)	56 (15.2%)	313 (84.8%)
c8	Friendship	8 (2.2%)	150 (40.7%)	211 (57.2%)
c9	Family relations	2 (0.5%)	56 (15.2%)	311 (84.3%)
c10	Neighbour relations	4 (1.1%)	141 (38.2%)	224 (60.7%)
c11	Children	29 (7.9%)	91 (24.7%)	249 (67.5%)
c12	health	1 (0.3%)	34 (9.2%)	331 (90.5%)
c13	Basic household goods	6 (1.6%)	129 (35.0%)	234 (63.4%)
c14	Improving community	15 (4.1%)	135 (36.6%)	219 (59.3%)
c16	Own vehicle	29 (7.9%)	142 (38.5%)	198 (53.7%)
c17	Participate neighbourhood	20 (5.4%)	215 (58.3%)	134 (36.3%)
c19	Personal progress	152 (41.2)	143 (38.8%)	74 (20.1%)
c20	Public transport	35 (9.5%)	197 (53.4%)	137 (37.1%)
c21	Room or house	4 (1.1%)	55 (14.9%)	310 (84.0%)
c22	Own business/shop	120 (32.5%)	126 (34.1%)	123 (33.3%)
c23	Recognised in community	33 (8.9%)	194 (52.6%)	142 (38.5%)
c24	Behaving well	1 (0.3%)	108 (29.3%)	260 (70.5%)
c25	Recreational space	41 (11.1%)	209 (56.6%)	119 (32.2%)
c26	Living environment	6 (1.6%)	132 (35.8%)	231 (62.6%)
c27	Teach others	16 (4.3%)	212 (57.5%)	141 (38.2%)
c28	Community peace	8 (2.2%)	130 (35.2%)	231 (62.6%)
t1	Partner	50 (13.6%)	119 (32.0%)	201 (54.5%)
t2	Telephone	51 (13.8%)	193 (52.3%)	125 (33.9%)
t3	Healthcare access	2 (0.5%)	112 (31.4%)	255 (69.1%)
t5	Accessories	176 (47.7%)	160 (43.4%)	33 (8.9%)
t6	Convenience goods	41 (11.1%)	181 (49.1%)	147 (39.8%)
t7	Provide for family	13 (3.5%)	101 (27.4%)	255 (69.1%)
t8	Travel for pleasure	156 (42.3%)	174 (47.2%)	39 (10.6%)
t10	Family occasions	10 (2.7%)	118 (32.0%)	241 (85.3%)
t11	Community groups compatible	6 (1.6%)	141 (38.2%)	222 (60.2%)
t12	Beautiful house	80 (21.7%)	175 (47.4%)	114 (30.9%)
t13	Small no. children	113 (30.6%)	148 (40.1%)	108 (29.3%)
t15	Metta-karuna	3 (0.8%)	160 (43.4%)	206 (55.8%)
t16	Well-behaved children	3 (0.8%)	66 (17.9%)	300 (81.3%)
t17	Satisfied with what have	4 (1.1%)	151 (40.9%)	214 (58.0%)

Table 2 continued

Item number	Item name	Necessity rating frequencies (%)		
		Not necessary	Necessary	Very necessary
t18	Wise spending	3 (0.8%)	114 (30.9%)	252 (68.3%)
t19	Spacious house	134 (36.3%)	135 (36.6%)	100 (27.1%)

Median satisfaction scores for each of the 44 items correlated significantly with their respective median necessity scores (Spearman's $r = 0.52$, $p < 0.001$), indicating that people tended on average to be more satisfied with the aspects of life considered most necessary. The same was true of mean scores ($r = 0.60$, $p < 0.001$).

3.5 Thai Weighted Goal Attainment Scores

In calculating the summary statistics for each weighted goal attainment item score (Table 4), 'not necessary' scores are excluded and presented separately (right hand column) to allow ease of interpretation (because all zero scores now indicate a deficit of something considered necessary to make people happy). Almost all items had a minimum score of zero, but for every item, the maximum score was 6 (product of goal necessity 2 x goal satisfaction 3), indicating that a 'very necessary' aspect of life has been achieved satisfactorily for at least one person.

4 Structure and Internal Consistency Reliability

4.1 Thai Unweighted Goal Satisfaction

PCA found 11 components with Eigenvalues >1, accounting for 59.10% of variance. Eleven is too many components to be useful in computing subscales and the structure was unclear: 16 items loaded >0.3 on more than one component. 42 of the 44 items loaded >0.3 on the 1st component, the exceptions being *personal progress* and *small no. of children*. The forced single factor solution found all items loading positively >0.3 except for *personal progress* and *small no. of children*, the latter loading a close 0.289. A single scale was therefore suggested, possibly including all 44 items (Table 5). *Thai Unweighted Goal Satisfaction* (*TUGS*) scale ($\alpha = 0.89$) was very good, with all items contributing well to the scale, and although removal of *personal progress* from the 44-item scale caused alpha to improve slightly, this was not substantial (Table 5). The single scale was therefore computed. The distribution was close to normal (skewness statistic 0.033; SE 0.127), indicating that parametric statistics can be used for analysis. The mean *TUGS* scale score was above 2, the midpoint of the three-point scale (mean 2.14, SD 0.36; median 2.14, ranging 1.77 to the maximum possible score of 3.00 on a three-point scale.

The PCA with three factors provided the clearest structure for *TUGS* subscales. The subscale structure was identical to that provided below for the weighted scores (Tables 6, 7), except that for the unweighted scores, two items (c26 *living environment* and t17 *satisfied with what have*) loaded with the *house and home* items, rather than with the *community/social/health* items. The full psychometric analysis is not provided here for reasons of space, but the internal consistency reliability of the three unweighted subscales was very good (21-item *community/social/health*, $\alpha = 0.85$; 16-item *house and home*, $\alpha = 0.82$; 6-item *nuclear family*, $\alpha = 0.85$). Although the distribution of two subscales

Table 3 Thai unweighted goal satisfaction item responses (44 items) $n = 369$

Item number	Item name	Satisfaction rating frequencies (%)			
		Do not have	Not satisfied	Medium satisfied	Satisfied
c1	Celebrations	18 (4.9%)	22 (6.0%)	182 (49.3%)	147 (39.8%)
c2	Clothes	1 (0.3%)	17 (4.6%)	152 (41.2%)	199 (53.9%)
c3	Faith	4 (1.1%)	20 (5.4%)	119 (32.2%)	226 (61.2%)
c4	Food	1 (0.3%)	14 (3.8%)	88 (23.8 %)	266 (72.1%)
c5	Education children	95 (25.7%)	37 (10.0%)	90 (24.4%)	147 (39.8%)
c6	Knowledge and education self	7 (1.9%)	49 (13.3%)	177 (48.0%)	136 (36.9%)
c7a	Electricity	3 (0.8%)	379 (10.0%)	95 (25.7%)	234 (63.4%)
c7b	Sanitation	64 (17.3%)	120 (32.5%)	121 (32.8%)	64 (17.3%)
c7c	Water	1 (0.3%)	51 (13.8%)	109 (29.5%)	208 (56.4%)
c8	Friendship	6 (1.6%)	10 (2.7%)	113 (30.6%)	240 (65.0%)
c9	Family relations	2 (0.5%)	16 (4.3%)	104 (28.2%)	247 (66.9%)
c10	Neighbour relations	0 (0%)	11 (3.0%)	155 (42.0%)	203 (55.0%)
c11	Children	84 (22.8%)	7 (1.9%)	52 (14.1%)	226 (61.2%)
c12	health	1 (0.3%)	68 (18.4%)	107 (29.0%)	193 (52.3%)
c13	Basic household goods	0 (0%)	16 (4.3%)	162 (43.9%)	191 (51.8%)
c14	Improving community	2 (0.5%)	104 (28.2%)	188 (50.9%)	75 (20.3%)
c16	own vehicle	42 (11.4%)	41 (11.1%)	125 (33.9%)	161 (43.6%)
c17	Participate neighbourhood	4 (1.1%)	20 (5.4%)	183 (49.6%)	162 (43.9%)
c19	Personal progress	115 (31.2%)	67 (18.2%)	126 (34.1%)	61 (16.5%)
c20	Public transport	61 (16.5%)	74 (20.1%)	164 (44.4%)	70 (19.0%)
c21	Room or house	0 (0%)	58 (15.7%)	147 (39.8%)	164 (44.4%)
c22	Own business/shop	252 (68.3%)	14 (3.8%)	44 (11.9%)	59 (16.0%)
c23	Recognised in community	15 (4.1%)	12 (3.3%)	173 (46.9%)	169 (45.8%)
c24	Behaving well	1 (0.3%)	6 (1.6%)	149 (40.4%)	213 (57.7%)
c25	Recreational space	74 (20.1%)	109 (29.5%)	133 (36.0%)	53 (14.4%)
c26	Living environment	0 (0%)	82 (22.2%)	164 (44.4%)	123 (33.3%)
c27	Teach others	24 (6.5%)	22 (6.0%)	171 (46.3%)	152 (41.2%)
c28	Community peace	1 (0.3%)	55 (14.9%)	169 (45.8%)	144 (39.0%)
t1	Partner	95 (25.7%)	12 (3.3%)	58 (15.7%)	204 (55.3%)
t2	Telephone	40 (10.8%)	44 (11.9%)	157 (42.5%)	128 (34.7%)
t3	Healthcare access	6 (1.6%)	31 (8.4%)	160 (43.4%)	172 (46.6%)
t5	Accessories	94 (25.5%)	35 (9.5%)	150 (40.7%)	90 (24.4%)
t6	Convenience goods	11 (3.0%)	25 (6.8%)	163 (44.2%)	170 (46.1%)
t7	Provide for family	50 (13.6%)	22 (6.0%)	108 (29.3%)	189 (51.2%)
t8	Travel for pleasure	95 (25.7%)	61 (16.5%)	132 (35.8%)	81 (22.0%)
t10	family occasions	13 (3.5%)	16 (4.3%)	104 (28.2%)	236 (64.0%)
t11	Community groups compatible	2 (0.5%)	43 (11.7%)	169 (45.8%)	155 (42.0%)
t12	Beautiful house	26 (7.0%)	71 (19.2%)	146 (39.6%)	126 (34.1%)
t13	Small no. children	97 (26.3%)	52 (14.1%)	83 (22.5%)	137 (37.1%)
t15	Metta-karuna	0 (0%)	3 (0.8%)	164 (44.4%)	202 (54.7%)
t16	Well-behaved children	83 (22.5%)	16 (4.3%)	103 (27.9%)	167 (45.3%)
t17	Satisfied with what have	0 (0%)	21 (5.7%)	150 (40.7%)	198 (53.7%)

Table 3 continued

Item number	Item name	Satisfaction rating frequencies (%)			
		Do not have	Not satisfied	Medium satisfied	Satisfied
t18	Wise spending	3 (0.8%)	44 (11.9%)	146 (39.6%)	176 (47.7%)
t19	Spacious house	32 (0.7%)	59 (16.0%)	128 (34.7%)	150 (40.7%)

approximated normality (*community/social/health* subscale skewness 0.090; SE 0.127; *house and home subscale* skewness −0.153, SE 0.127) the unweighted nuclear family subscale was non-normally distributed (skewness −0.779, SE 0.127). All mean and median satisfaction ratings were above the midpoint (2) of the three-point scale and were fairly similar (*community/social/health* mean 2.26, SD 0.37; median 2.24, ranging 1.14–3.00; *house and home* mean 2.12, SD 0.43; median 2.13, ranging 0.81–3.00; *nuclear family* mean 1.96, SD 0.91; median 2.17, ranging 0.00–3.00), only the *nuclear family* subscale having a median differing markedly from the mean. For consistency, however, non-parametric statistics were used for analysis involving all three subscales.

4.2 Thai Weighted Goal Attainment

The first PCA found 11 components with Eigenvalues >1, accounting for 58.76% of variance. There were too many components to provide useful subscales and the structure was unclear, with 12 items each loading on more than one component. The single factor solution found all items except *progress*, *shop/business to buy/sell* and *spacious house* loading >0.3, but these three loaded positively >0.2, suggesting that they might be included in a single scale. Coding necessity as 0–2 rather than 1–3 in the weighting process had a negligible effect on the factor structure. The single factor loadings from weighted scores computed with the two different coding methods were strongly correlated (Spearman's $r = 0.98$, $p < 0.001$, $n = 369$).

The two-factor solution found six *nuclear family* items loading >0.3 on one component and the remaining items loading on the other. The same three items as above (*personal progress*, *shop/business to buy/sell* and *spacious house*) loaded on neither component. The three-factor solution was clearer: the first comprised 23 *community/social/health* items; the second was 15 *house and home* items (including both basics and luxuries); the third was six *nuclear family* items. The four-factor solution was similar, but the inclusion of an additional factor split *house and home* items into eleven *basic house and home* items and four *luxuries*. Because this dichotomy might be useful for some purposes, both solutions are shown in Table 6, after the single factor solution. Five and six factor solutions did not improve the clarity, due to double loadings and non-loading items.

Internal consistency reliability tests (item-total correlation and Cronbach's alpha) were conducted on the 44-item scale and on the subscales found in both the three-factor and four-factor solutions. The alpha of the single scale was very good ($\alpha = 0.89$). It remained the same or declined when each item was removed in turn, except when *personal progress* was removed, resulting in a slightly increased alpha. For the three-factor solution, the 3 subscales each had good internal consistency reliability ($\alpha = 0.90$, 0.80 and 0.82, respectively) and all items contributed well (Table 7). From the four-factor solution, although alpha for the *basic house and home subscale* was good ($\alpha = 0.80$), that for the 4-item *luxuries* subscale was only 0.63, below the criterion level of 0.7. The three factor solution thus provides more reliable subscales (Table 7).

Table 4 Thai weighted goal attainment item scores: summary statistics (44 items) $n = 369$

Item number	Item name	Mean	SD	Median	Min	Max	Not necessary
c1	Celebrations	3.19	1.69	3	0	6	32 (8.7%)
c2	Clothes	3.89	1.73	4	0	6	21 (5.7%)
c3	Faith	4.26	1.81	4	0	6	2 (0.5%)
c4	Food	5.04	1.45	6	0	6	3 (0.8%)
c5	Education children	3.36	2.41	4	0	6	9 (2.4%)
c6	Knowledge and education self	3.66	1.79	4	0	6	21 (5.7%)
c7a	Electricity	4.64	1.68	6	0	6	2 (0.5%)
c7b	Sanitation	2.42	1.79	2	0	6	27 (7.3%)
c7c	Water	4.51	1.69	6	0	6	0 (0%)
c8	Friendship	4.23	1.82	4	0	6	8 (2.2%)
c9	Family relations	4.89	1.55	6	0	6	2 (0.5%)
c10	Neighbour relations	4.16	1.72	4	1	6	4 (1.1%)
c11	Children	4.01	2.39	6	0	6	29 (7.9%)
c12	Health	4.46	1.66	4	0	6	1 (0.3%)
c13	Basic household goods	4.12	1.64	4	1	6	6 (1.6%)
c14	Improving community	3.12	1.58	2	0	6	15 (4.1%)
c16	Own vehicle	3.49	2.01	3	0	6	29 (7.9%)
c17	Participate neighbourhood	3.38	1.65	3	0	6	20 (5.4%)
c19	Personal progress	2.37	1.58	2	0	6	152 (41.2)
c20	Public transport	2.19	1.78	2	0	6	35 (9.5%)
c21	Room or house	4.24	1.10	4	1	6	4 (1.1%)
c22	Own business/shop	1.55	2.15	0	0	6	120 (32.5%)
c23	Recognised in community	3.52	1.70	3	0	6	33 (8.9%)
c24	Behaving well	4.44	1.66	4	0	6	1 (0.3%)
c25	Recreational space	2.11	1.67	2	0	6	41 (11.1%)
c26	Living environment	3.45	1.65	3	1	6	6 (1.6%)
c27	Teach others	3.27	1.76	3	0	6	16 (4.3%)
c28	Community peace	3.77	1.73	4	1	6	8 (2.2%)
t1	Partner	3.78	2.32	4	0	6	50 (13.6%)
t2	Telephone	3.04	1.79	2	0	6	51 (13.8%)
t3	Healthcare access	4.02	1.76	4	0	6	2 (0.5%)
t5	Accessories	2.35	1.49	2	0	6	176 (47.7%)
t6	Convenience goods	3.50	1.75	3	0	6	41 (11.1%)
t7	Provide for family	3.93	2.16	4	0	6	13 (3.5%)
t8	Travel for pleasure	2.14	1.49	2	0	6	156 (42.3%)
t10	Family occasions	4.32	1.87	6	0	6	10 (2.7%)
t11	Community groups compatible	3.80	1.78	4	0	6	6 (1.6%)
t12	Beautiful house	2.98	1.75	2	0	6	80 (21.7%)
t13	Small no. children	2.77	2.22	2	0	6	113 (30.6%)
t15	Metta-karuna	4.09	1.77	4	1	6	3 (0.8%)
t16	Well-behaved children	3.67	2.38	4	0	6	3 (0.8%)
t17	Satisfied with what have	4.00	1.69	4	1	6	4 (1.1%)

Table 4 continued

Item number	Item name	Mean	SD	Median	Min	Max	Not necessary
t18	Wise spending	4.04	1.77	4	0	6	3 (0.8%)
t19	Spacious house	3.18	1.82	3	0	6	134 (36.3%)

4.3 Thai Individualised Goal Attainment

Individualising the WeDQoL-goals Thailand measure involves not only weighting items according to their perceived necessity (as shown above in the weighted goal attainment analysis) but also excluding items considered by the individual to be unnecessary for their happiness. For a reliable Principal Components Analysis, at least five cases are needed for every variable entered (Tabachnick and Fidell 2001). All except 37 respondents considered at least one item 'not necessary' for wellbeing, so that PCA was not possible on the reduced dataset of 37. The internal consistency reliability statistics of the same scales and subscales as found in the PCAs for Weighted Goal Attainment scores could, nonetheless, be checked *after* coding 'not necessary' items as 'not applicable' within a dataset that was reduced (hence the different *n* for each subscale analysis). Alpha statistics provided good support for the individualised scale and three subscales: *TIGA* scale, ($\alpha = 0.93$, $n = 37$); *community/social/health* ($\alpha = 0.90$, $n = 157$); *house and home* ($\alpha = 0.83$, $n = 72$); *nuclear family* ($\alpha = 0.861$, $n = 209$). Most items contributed well to their respective scale and subscales, with alpha falling when each was removed in turn. In the *house and home* subscale, alpha increased slightly when *own business/shop* and when *spacious house* were removed in turn. In the *nuclear family* subscale, alpha increased slightly when *partner* and when *provide for family* were each removed. The damage caused to the subscales by inclusion of these items is minimal and all items can be retained.

Thai Individualised Goal Attainment (*TIGA*) scale and subscale scores were therefore computed as the mean of contributing items. Means of the three *TIGA* subscale scores were similar (*community/social/health* mean 3.70, SD 0.96; *house and home* mean 3.59, SD 0.97; *nuclear family* mean 3.60, SD 1.81). Normality testing revealed that the *TIGA scale* was normally distributed (skewness statistic 0.095; SE 0.127) and the *house and home* subscale was very close to normal (skewness statistic 0.055; SE 0.127). The *community/social* subscale scores also did not deviate far from normality (skewness statistic 0.295; SE 0.127) but for *nuclear family*, they spread across the range, with a tendency for more responses to fall towards the top of the scale (large skewness statistic of −0.507; SE 0.127). This indicated that non-parametric statistics (Kruskal–Wallis and post hoc Mann–Whitney *U* tests) should be used for analyses conducted on the subscales, even though ANOVA and *t*-tests are fairly robust to non-normality. The analyses for the unweighted (*TUGS*) and individualised (*TIGA*) scores will therefore use the same tests (parametric for the scale and non-parametric for the subscales).

4.4 Correlation Between Scale Scores

In order to determine whether the process of weighting goal satisfaction scores and excluding those considered unnecessary influenced the scores in a manner other than inflating them, the 44-item *Thai Unweighted Goal Satisfaction* score (*TUGS*) was

Table 5 Thai unweighted goal satisfaction (*TUGS*) principal component analysis single factor solution and internal consistency reliability alpha statistics (44 items) $n = 369$

Item number	Item name	Single factor solution (20.26% variance) Factor loadings	Thai unweighted goal satisfaction 44-item single scale ($\alpha = 0.892$)	
			Corrected item-total correlation	Cronbach's alpha if item deleted
c1	Celebrations	**0.453**	0.377	0.889
c2	Clothes	**0.452**	0.389	0.889
c3	Faith	**0.415**	0.367	0.890
c4	Food	**0.497**	0.410	0.889
c5	Education children	**0.442**	0.492	0.887
c6	Knowledge and education self	**0.575**	0.500	0.888
c7a	Electricity	**0.494**	0.421	0.889
c7b	Sanitation	**0.376**	0.361	0.890
c7c	Water	**0.417**	0.360	0.890
c8	Friendship	**0.396**	0.318	0.890
c9	family relations	**0.364**	0.316	0.890
c10	Neighbour relations	**0.585**	0.494	0.889
c11	Children	**0.314**	0.372	0.890
c12	Health	**0.312**	0.246	0.891
c13	Basic household goods	**0.603**	0.528	0.888
c14	Improving community	**0.363**	0.319	0.890
c16	Own vehicle	**0.396**	0.350	0.890
c17	Participate neighbourhood	**0.462**	0.388	0.889
c19	Personal progress	0.164	0.153	0.894
c20	Public transport	**0.343**	0.290	0.891
c21	Room or house	**0.442**	0.369	0.890
c22	Own business/shop	**0.317**	0.295	0.891
c23	Recognised in community	**0.507**	0.441	0.889
c24	Behaving well	**0.537**	0.463	0.889
c25	Recreational space	**0.360**	0.337	0.890
c26	Living environment	**0.540**	0.470	0.888
c27	Teach others	**0.551**	0.494	0.888
c28	Community peace	**0.481**	0.401	0.889
t1	Partner	**0.363**	0.378	0.890
t2	Telephone	**0.429**	0.381	0.889
t3	Healthcare access	**0.410**	0.357	0.890
t5	Accessories	**0.482**	0.444	0.888
t6	Convenience goods	**0.527**	0.464	0.888
t7	Provide for family	**0.495**	0.482	0.888
t8	Travel for pleasure	**0.502**	0.434	0.888
t10	Family occasions	**0.515**	0.454	0.888
t11	Community groups compatible	**0.493**	0.405	0.889
t12	Beautiful house	**0.384**	0.362	0.890
t13	Small no. children	0.289	0.345	0.890

Table 5 continued

Item number	Item name	Single factor solution (20.26% variance) Factor loadings	Thai unweighted goal satisfaction 44-item single scale ($\alpha = 0.892$)	
			Corrected item-total correlation	Cronbach's alpha if item deleted
t15	Metta-karuna	**0.559**	0.478	0.889
t16	Well-behaved children	**0.303**	0.348	0.890
t17	Satisfied with what have	**0.529**	0.454	0.889
t18	Wise spending	**0.568**	0.507	0.888
t19	Spacious house	**0.360**	0.320	0.890

Bold denotes loading >0.3

correlated against the 44-item *Thai Individualised Goal Attainment* Score (*TIGA*). The correlation, though significant, was far from perfect (Spearman's $r = 0.84$, $p < 0.01$, $n = 369$), indicating that including weights and excluding unnecessary items to introduce an individual perspective of quality of life does indeed influence scores.

It may be argued that coding necessity 0–2 rather than 1–3 distorts the weighted goal attainment scores of those considering items 'unnecessary' (by automatically assigning the value zero to the weighted scores). However, the weighted scale scores derived from the 0–2 coding and 1–3 coding correlated almost perfectly (Spearman's $r = 0.99$, $p < 0.001$, $n = 369$). It may be argued further that elimination of aspects of life considered 'unnecessary' when computing the individualised *TIGA* scores distorts overall quality of life scores, but the correlation between the individualised *TIGA* scale scores and 44-item weighted goal satisfaction scores (before removing unnecessary items) was also very high (Spearman's $r = 0.96$, $p < 0.001$, $n = 369$). The correlation was also $r = 0.96$ when the weighted score was computed with necessity ratings coded 1–3.

4.5 Convergent Validity

The scale structure of the translated and revised Diener Satisfaction with Life Scale (SWLS) was determined using PCA (Eigenvalues >1), revealing a 5-item single scale structure (all loadings >0.65). The alpha of a single scale was 0.74, falling when each item was removed in turn. The structure was thus similar to the original version (American English with seven response options per item). The SWLS score correlated $r = 0.43$ ($n = 368$) with the unweighted *TUGS* scale score, 0.36 with the weighted goal satisfaction scale score and $r = 0.33$ ($n = 368$) with the individualised *TIGA* scale scores (all $p < 0.001$).

4.6 Subgroup Comparisons

Table 8 shows comparisons between subgroups defined by age-group, gender and marital status, first for unweighted (*TUGS*) scale and subscales and then for the individualised scores (*TIGA*). In each case, post hoc comparisons were made only where the initial ANOVA or Kruskal–Wallis test survived the Bonferroni correction of $p = 0.01$. Both the *TUGS* and *TIGA* scale score differed between age-groups, with those under 25 reporting poorer quality of life on this scale than those in each of the three older categories (25–44, 45–64 and 65+ years). The youngest group also had significantly lower *nuclear family* subscale scores than did the three other age-groups (Table 8). *TIGA nuclear family* scores

Table 6 Thai weighted goal attainment scores: principal components analysis ($n = 369$)

Item number	Item name	Single factor (22.33% variance) Thai 44-item weighted goal attainment ($\alpha = 0.911$)	Forced 3-factor solution (34.14% variance)			Forced 4-factor solution (38.490% variance)			
			Community/ social/health ($\alpha = 0.895$)	House and home ($\alpha = 0.799$)	Nuclear family ($\alpha = 0.815$)	Community/ social/health ($\alpha = 0.895$)	House and home ($\alpha = 0.803$)	Nuclear family ($\alpha = 0.815$)	Luxuries ($\alpha = 0.631$)
c1	Celebrations	**0.509**	**0.430**	0.208	0.197	**0.427**	0.098	0.188	0.283
c3	Faith	**0.405**	**0.413**	0.025	0.231	**0.413**	0.041	0.228	0.003
c6	Knowledge and education self	**0.589**	**0.688**	0.063	0.061	**0.685**	0.094	0.057	0.006
c8	Friendship	**0.516**	**0.450**	0.232	0.126	**0.446**	0.093	0.115	[0.347]
c9	Family relations	**0.462**	**0.364**	0.249	0.137	**0.356**	0.217	0.135	0.146
c10	Neighbour relations	**0.642**	**0.592**	0.264	0.120	**0.585**	0.200	0.113	0.227
c12	Health	**0.407**	**0.430**	0.173	−0.078	**0.422**	0.212	−0.076	0.003
c14	Improving community	**0.488**	**0.383**	[0.367]	−0.037	**0.371**	0.282	−0.042	0.279
c17	Participate neighbourhood	**0.579**	**0.624**	0.087	0.147	**0.623**	0.054	0.140	0.127
c20	Public transport	**0.354**	**0.391**	0.071	0.035	**0.388**	0.094	0.034	0.002
c23	Recognised in community	**0.532**	**0.447**	0.289	0.084	**0.440**	0.169	0.075	[0.326]
c24	Behaving well	**0.611**	**0.636**	0.139	0.129	**0.632**	0.157	0.126	0.046
c25	Recreational space	**0.325**	**0.361**	0.082	−0.004	**0.359**	0.035	−0.010	0.134
c26	Living environment	**0.589**	**0.565**	0.282	−0.019	**0.554**	0.294	−0.019	0.090
c27	Teach others	**0.560**	**0.638**	0.040	0.137	**0.637**	0.050	0.131	0.035
c28	Community peace	**0.566**	**0.644**	0.110	0.013	**0.639**	0.138	0.010	0.022

Table 6 continued

Item number	Item name	Single factor (22.33% variance)Thai 44-item weighted goal attainment ($\alpha = 0.911$)	Forced 3-factor solution (34.14% variance)			Forced 4-factor solution (38.490% variance)			
			Community/ social/health ($\alpha = 0.895$)	House and home ($\alpha = 0.799$)	Nuclear family ($\alpha = 0.815$)	Community/ social/health ($\alpha = 0.895$)	House and home ($\alpha = 0.803$)	Nuclear family ($\alpha = 0.815$)	Luxuries ($\alpha = 0.631$)
t3	Healthcare access	**0.447**	**0.383**	0.274	−0.006	**0.374**	0.234	−0.008	0.170
t8	Travel pleasure	**0.339**	**0.345**	0.174	−0.083	**0.340**	0.070	−0.092	0.263
t10	Family occasions	**0.551**	**0.456**	0.229	0.232	**0.450**	0.180	0.228	0.177
t11	Community groups compatible	**0.609**	**0.639**	0.148	0.098	**0.633**	0.214	0.099	−0.040
t15	Metta-karuna	**0.634**	**0.688**	0.085	0.169	**0.686**	0.128	0.167	−0.011
t17	Satisfied with what have	**0.569**	**0.527**	0.248	0.075	**0.519**	0.221	0.072	0.149
t18	Wise spending	**0.592**	**0.599**	0.149	0.140	**0.594**	0.202	0.141	−0.019
c4	Food	**0.506**	[0.307]	**0.489**	−0.005	0.288	**0.523**	0.003	0.082
c2	Clothes	**0.484**	0.222	**0.562**	0.011	0.203	**0.479**	0.012	[0.310]
c7a	Electricity	**0.485**	0.136	**0.662**	0.053	0.110	**0.766**	0.071	−0.018
c7b	Sanitation	**0.419**	0.236	**0.371**	0.105	0.221	**0.462**	0.117	−0.062
c7c	Water	**0.462**	0.121	**0.655**	0.027	0.095	**0.733**	0.044	0.029
c13	Basic household goods	**0.591**	0.289	**0.591**	0.139	0.268	**0.585**	0.146	0.178
c16	Own vehicle	**0.383**	0.146	**0.464**	0.046	0.129	**0.475**	0.054	0.107
c19	Personal progress	0.242	0.158	***0.218***	−0.005	0.155	0.014	−0.019	**0.446**
c21	Room or house	**0.442**	0.173	**0.549**	0.023	0.151	**0.604**	0.035	0.048
c22	Own business/ shop	0.219	0.048	***0.286***	0.080	0.037	**0.349**	0.090	−0.042

Table 6 continued

Item number	Item name	Single factor (22.33% variance)Thai 44-item weighted goal attainment ($\alpha = 0.911$)	Forced 3-factor solution (34.14% variance)			Forced 4-factor solution (38.490% variance)			
			Community/ social/health ($\alpha = 0.895$)	House and home ($\alpha = 0.799$)	Nuclear family ($\alpha = 0.815$)	Community/ social/health ($\alpha = 0.895$)	House and home ($\alpha = 0.803$)	Nuclear family ($\alpha = 0.815$)	Luxuries ($\alpha = 0.631$)
t2	Telephone	**0.483**	0.260	**0.472**	0.071	0.245	**0.420**	0.072	0.234
t5	Accessories	**0.361**	0.202	**0.350**	0.037	0.192	0.220	0.031	**0.344**
t6	Convenience goods	**0.436**	0.120	**0.600**	0.047	0.100	**0.517**	0.050	[0.313]
t12	Beautiful house	**0.303**	0.007	**0.457**	0.154	−0.000	0.096	0.134	**0.783**
t19	Spacious house	0.216	−0.082	**0.435**	0.0136	−0.088	0.046	0.114	**0.822**
c5	Education children	**0.476**	0.211	0.123	**0.804**	0.213	0.138	**0.806**	0.005
c11	Children	**0.367**	0.015	0.165	**0.870**	0.017	0.152	**0.873**	0.052
t1	Partner	**0.362**	0.073	0.271	**0.515**	0.067	0.288	**0.521**	0.033
t7	Provide for family	**0.499**	[0.373]	0.104	**0.498**	[0.373]	0.108	**0.497**	0.036
t13	Small no. children	**0.213**	0.077	−0.016	**0.532**	0.083	−0.074	**0.527**	0.101
t16	Well-behaved children	**0.385**	0.098	0.091	**0.852**	0.102	0.074	**0.852**	0.046

[Bracketed] loading indicates >0.3 but lower than loading onto another component

Bold denotes item loading >0.3

Bold italics denotes item loading <0.3 but included in subscale with strongest loading

Table 7 44-Item Thai weighted goal attainment single scale and three subscales: internal consistency reliability statistics ($n = 369$)

Item number	Item name	Corrected item-total correlation	Alpha if item deleted	Item number	Item name	Corrected item-total correlation	Alpha if item deleted
44-Item Thai weighted goal attainment ($\alpha = 0.911$)				*23-Item community/social/health subscale ($\alpha = 0.895$)*			
c1	Celebrations	0.461	0.909	c1	Celebrations	0.465	0.891
c2	Clothes	0.440	0.909	c3	Faith	0.379	0.893
c3	Faith	0.355	0.910	c6	Knowledge and education self	0.596	0.887
c4	Food	0.449	0.909	c8	Friendship	0.478	0.891
c5	Education children	0.488	0.909	c9	Family relations	0.400	0.892
c6	Knowledge and education self	0.523	0.908	c10	Neighbour relations	0.616	0.887
c7a	Electricity	0.444	0.909	c12	Health	0.379	0.893
c7b	Sanitation	0.384	0.910	c14	Improving comm	0.428	0.892
c7c	Water	0.421	0.909	c17	Participate neighbourhood	0.583	0.888
c8	Friendship	0.463	0.909	c20	Public transport	0.336	0.894
c9	Family relations	0.416	0.909	c23	Recognised in community	0.487	0.890
c10	Neighbour relations	0.584	0.908	c24	Behaving well	0.585	0.888
c11	Children	0.390	0.910	c25	Recreational space	0.312	0.895
c12	Health	0.347	0.910	c26	Living environment	0.555	0.889
c13	Basic household goods	0.551	0.908	c27	Teach others	0.567	0.888
c14	Improving community	0.438	0.909	c28	Community peace	0.574	0.888
c16	Own vehicle	0.346	0.910	t3	Healthcare access	0.398	0.893
c17	Participate neighbourhood	0.511	0.908	t8	Travel for pleasure	0.326	0.894
c19	Personal progress	0.223	0.911	t10	Family occasions	0.496	0.890
c20	Public transport	0.307	0.911	t11	Community groups compatible	0.590	0.888
c21	Room or house	0.397	0.910	t15	Metta-karuna	0.628	0.887
c22	Own business/shop	0.202	0.912	t17	Satisfied with what have	0.523	0.890
c23	Recognised in community	0.475	0.909	t18	Wise spending	0.560	0.889

Table 7 continued

Item number	Item name	Corrected item-total correlation	Alpha if item deleted	Item number	Item name	Corrected item-total correlation	Alpha if item deleted
c24	Behaving well	0.545	0.908	*15-item house and home subscale ($\alpha = 0.799$)*			
c25	Recreational space	0.292	0.911	c2	Having clothes	0.485	0.781
c26	Living environment	0.527	0.908	c4	Food	0.449	0.785
c27	Teach others	0.496	0.908	c7a	Electricity	0.528	0.779
c28	Community peace	0.488	0.909	c7b	Sanitation	0.336	0.793
t1	Partner	0.365	0.910	c7c	Water	0.514	0.780
t2	Telephone	0.452	0.909	c13	Basic household goods	0.558	0.777
t3	Healthcare access	0.391	0.910	c16	Own vehicle	0.396	0.789
t5	Accessories	0.351	0.910	c19	Personal progress	0.212	0.801
t6	Convenience goods	0.408	0.909	c21	Room or house	0.446	0.785
t7	Provide for family	0.477	0.909	c22	Own business/shop	0.234	0.801
t8	Travel for pleasure	0.303	0.911	t2	Telephone	0.485	0.781
t10	Family occasions	0.512	0.908	t5	Accessories	0.359	0.791
t11	Community groups compatible	0.533	0.908	t6	Convenience goods	0.508	0.779
t12	Beautiful house	0.308	0.911	t12	Beautiful house	0.361	0.791
t13	Small no. children	0.224	0.912	t19	Spacious house	0.299	0.797
t15	Metta-karuna	0.565	0.908	*6-Item nuclear family subscale ($\alpha = 0.815$)*			
t16	Well-behaved children	0.400	0.910	c5	Education children	0.732	0.750
t17	Satisfied with what have	0.509	0.908	c11	Having children	0.754	0.743
t18	Wise spending	0.527	0.908	t1	Partner	0.432	0.818
t19	Spacious house	0.222	0.912	t7	Provide for family	0.449	0.812
				t13	Small no. children	0.406	0.820
				t16	Well-behaved children	0.714	0.755

Table 8 Thai unweighted goal satisfaction and individualised goal attainment scores: age, gender and marital status comparisons

Scale/subscale score and between-group comparisons*	Age-group	*N*	Mean	SD	*p* Value of post hoc Tukey HSD (*T*); Mann–Whitney *U* for subscales		
					<25	25–44	45–64
TUGS scale SS = 3.08 (3 df) $M^2 = 1.03$; $F = 8.33$ (**$p < 0.001$**)	<25	51	1.93	0.31			
	25–44	138	2.18	0.35	***T* < 0.001**		
	45–64	107	2.22	0.34	***T* < 0.001**	$T = 0.80$	
	65+	73	2.12	0.39	$T = 0.02$	$T = 0.62$	$T = 0.22$
TUGS community/social/health K–W chi-sq 2.67; 3 df ($p = 0.45$)	<25	51	2.18	0.37			
	25–44	138	2.28	0.36			
	45–64	107	2.27	0.35			
	65+	73	2.24	0.40			
TUGS house and home K–W chi-sq 2.70; 3 df ($p = 0.44$)	<25	51	2.11	0.36			
	25–44	138	2.14	0.42			
	45–64	107	2.14	0.47			
	65+	73	2.04	0.45			
TUGS nuclear family K–W chi-sq 88.68 (3 df) (**$p < 0.001$**)	<25	51	0.70	0.75			
	25–44	138	2.07	0.92	***U* < 0.001**		
	45–64	107	2.36	0.52	***U* < 0.001**	$U = 0.25$	
	65+	73	2.06	0.66	***U* < 0.001**	$U = 0.18$	***U* = 0.002**

	Gender	*N*	Mean	SD
TUGS scale $t = 2.00$; 367 df ($p = 0.046$)	Male	169	2.19	0.37
	Female	200	2.11	0.35
TUGS community/social/health $U = 14{,}026.5$ (**$p = 0.005$**)	Male	169	2.31	0.36
	Female	200	2.20	0.37
TUGS house and home $U = 15{,}126.0$ ($p = 0.08$)	Male	169	2.16	0.42
	Female	200	2.08	0.44
TUGS nuclear family $U = 16{,}603.5$ ($p = 0.77$)	Male	169	1.92	0.99
	Female	200	1.99	0.84

	Marital status	*N*	Mean	SD	Single	Married	Widowed
TUGS scale 44 items SS = 9.40 (3 df) $M^2 = 3.13$; $F = 29.59$ (**$p < 0.001$**)	Single	66	1.89	0.30			
	Married	241	2.26	0.33	***T* < 0.001**		
	Widowed	52	1.96	0.34	$T = 0.59$	***T* < 0.001**	
	Divorced	10	2.04	0.40	$T = 0.50$	$T = 0.16$	$T = 0.90$

Table 8 continued

	Marital status	*N*	Mean	SD	Single	Married	Widowed
TUGS community/social/health K–W chi-sq = 14.10 (3 df) (***p* = 0.003**)	Single	66	2.18	0.37			
	Married	241	2.31	0.36	$U = 0.026$		
	Widowed	52	2.13	0.35	$U = 0.34$	***U* = 0.001**	
	Divorced	10	2.16	0.43	$U = 0.68$	$U = 0.20$	$U = 0.94$
TUGS house and home K–W chi-sq 22.17 (3 df) (***p* < 0.001**)	Single	66	2.08	0.37			
	Married	241	2.19	0.42	$U = 0.06$		
	Widowed	52	1.86	0.46	$U = 0.009$	***U* < 0.001**	
	Divorced	10	1.99	0.50	$U = 0.55$	$U = 0.23$	$U = 0.45$
TUGS nuclear family K–W chi-sq = 199.03 (3 df) (***p* < 0.001**)	Single	66	0.43	0.34			
	Married	241	2.42	0.56	***U* < 0.001**		
	Widowed	52	1.77	0.50	***U* < 0.001**	***U* < 0.001**	
	Divorced	10	2.02	0.43	***U* < 0.001**	***U* = 0.004**	$U = 0.14$

Individualised scores	Age-group	*N*	Mean	SD	*p* Value of post hoc Tukey HSD (*T*); Mann–Whitney *U* for subscales		
					25–44	45–64	65+
TIGA scale SS = 15.28 (3 df) $M^2 = 5.092$; $F = 6.945$ ($p < 0.001$)	<25	51	3.16	0.59			
	25–44	138	3.70	0.87	***T* = 0.001**		
	45–64	107	3.80	0.86	***T* < 0.001**	$T = 0.79$	
	65+	73	3.65	0.98	***T* = 0.010**	$T = 0.97$	$T = 0.63$
TIGA community/social/health K–W chi-sq 2.53 (3 df) ($p = 0.47$)	<25	51	3.49	0.78			
	25–44	138	3.73	0.92			
	45–64	107	3.77	0.97			
	65+	73	3.69	1.13			
TIGA house and home K–W chi-sq 1.86 (3 df) ($p = 060$)	<25	51	3.43	0.79			
	25–44	138	3.64	0.99			
	45–64	107	3.64	1.04			
	65+	73	3.53	0.95			
TIGA nuclear family K–W chi-sq (3 df) ($p < 0.001$)	<25	51	1.14	1.36			
	25–44	138	3.81	1.79	***U* < 0.001**		
	45–64	107	4.35	1.19	***U* < 0.001**	$U = 0.134$	
	65+	73	3.82	1.42	***U* < 0.001**	$U = 0.275$	***U* = 0.003**

	Gender	*N*	Mean	SD
TIGA scale $t = 1.77$ (367 df) ($p = 0.08$)	Male	169	3.73	0.88
	Female	200	3.57	0.87
TIGA community/social/health $U = 14{,}322.5$ (***p* = 0.01**)	Male	169	3.83	0.95
	Female	200	3.60	0.96
TIGA house and home $U = 16{,}029.5$ ($p = 0.39$)	Male	169	3.64	0.96
	Female	200	3.55	0.97
TIGA nuclear family $U = 16{,}385.5$ ($p = 0.61$)	Male	169	3.58	1.94
	Female	200	3.62	1.71

Table 8 continued

	Marital status	*N*	Mean	SD	Single	Married	Widowed
TIGA scale 44 items SS = 33.73 (3 df) $M^2 = 11.24$; $F = 16.47$ (**$p < 0.001$**)	Single	66	3.10	0.66			
	Married	241	3.85	0.85	***T* < 0.001**		
	Widowed	52	3.38	0.87	$T = 0.24$	***T* = 0.001**	
	Divorced	10	3.61	0.99	$T = 0.26$	$T = 0.80$	$T = 0.86$
TIGA community/social/health K–W chi-sq = 3.64 (3 df) ($p = 0.037$)	Single	66	3.51	0.82			
	Married	241	3.80	0.97			
	Widowed	52	3.49	0.97			
	Divorced	10	3.79	1.23			
TIGA house and home K–W chi-sq 16.85 (3 df) (**$p = 0.001$**)	Single	66	3.38	0.83			
	Married	241	3.74	0.97	***U* = 0.007**		
	Widowed	52	3.21	0.97	$U = 0.27$	***U* = 0.001**	
	Divorced	10	3.31	0.98	$U = 0.56$	$U = 0.17$	$U = 0.67$
TIGA nuclear family K–W chi-sq = 181.72 (3 df) (**$p < 0.001$**)	Single	66	0.74	0.74			
	Married	241	4.40	1.25	***U* < 0.001**		
	Widowed	52	3.49	1.33	***U* < 0.001**	***U* < 0.001**	
	Divorced	10	3.72	1.18	***U* < 0.001**	$U = 0.03$	$U = 0.34$

* ANOVA/*t*-test; Kruskal–Wallis (KW)/Mann–Whitney *U*: Bonferroni correction for 4 tests in each block: $p < 0.01$ accepted for multiple comparison tests and $p < 0.008$ for post hoc tests (bold)

were also poorer amongst the 65+ age-group than the 45–64-year-olds, who had the highest *nuclear family* satisfaction levels. The only gender difference was in the *community/social/health* score (both *TUGS* and *TIGA*), with men scoring higher than women ($p \leq 0.01$). Married people (which included those in partnerships blessed by a Buddhist monk) scored higher than single or widowed people on the scale score, *house and home* subscale and *nuclear family* subscale (both *TUGS* and *TIGA*). *Nuclear family* scores were lower for single people than all others, including widowed and divorced people, though there is clearly an overlap between those who are single and those who are in the youngest age-bracket. Moreover, widowed people scored lower than married people on the *nuclear family* subscale (both *TUGS* and *TIGA*). The overall findings were broadly similar for unweighted and individualised scores, although the *TIGA community/social/health* subscale differences according to marital status did not survive the Bonferroni correction ($p = 0.037$).

Table 9 provides geographical, religious and location comparisons for unweighted and individualised scores. The findings for *TUGS* and *TIGA* scores were similar. Those in South Thailand scored higher than did those in the Northeast on the *TUGS* and *TIGA* single scale and on the *community/social/health* and *house and home* subscales. Muslims scored significantly higher than Buddhists on the single scale and on the first two subscales, and there was no difference in the *nuclear family* scores. However, while the entire Northeast sample was Buddhist, only 46.5% of Southerners were, the remainder being Muslim. Comparing *only* the Buddhists in the two regions, *t*-tests (and Mann–Whitney for subscales) confirmed the regional difference: the Southerners had higher *TUGS* scale scores ($t = -5.29$, 268 df, $p < 0.001$) *community/social/health* ($U = 5{,}463.0$, $p < 0.001$), *house and home* ($U = 4{,}289.5$, $p < 0.001$) and *nuclear family* ($U = 6{,}244.0$, $p = 0.005$). Similar

Table 9 Thai unweighted goal satisfaction and individualised goal attainment scores: geographic, religious, location and economic comparisons

Scale/subscale score and between-group comparisons* Unweighted scores	Region of thailand	*N*	Mean	SD	*p* Value of post hoc Tukey HSD (*T*); Mann–Whitney *U* for subscales
TUGS scale $t = -6.00$ (367 df) (**$p < 0.001$**)	Northeast	184	2.04	0.35	
	South	185	2.25	0.34	
TUGS community/social/health $U = 5{,}463.0$ (**$p < 0.001$**)	Northeast	184	2.16	0.37	
	South	185	2.35	0.35	
TUGS house and home $U = 4{,}289.5$ (**$p < 0.001$**)	Northeast	184	1.96	0.41	
	South	185	2.27	0.40	
TUGS nuclear family $U = 6{,}244.0$ (**$p = 0.005$**)	Northeast	184	1.85	0.88	
	South	185	2.07	0.93	

	Religion	*N*	Mean	SD
TUGS scale $t = 3.01$ (367 df) (**$p = 0.003$**)	Muslim	99	3.24	0.37
	Buddhist	270	2.11	0.35
TUGS community/social/health $U = 10{,}833.0$ (**$p = 0.005$**)	Muslim	99	2.34	0.35
	Buddhist	270	2.22	0.40
TUGS house and home $U = 102{,}105.00$ (**$p = 0.001$**)	Muslim	99	2.24	0.43
	Buddhist	270	2.07	0.42
TUGS nuclear family $U = 11{,}603.0$ ($p = 0.052$)	Muslim	99	2.06	0.96
	Buddhist	270	1.93	0.89

	Site type	*N*	Mean	SD	Rural	Peri-urban
TUGS scale ss = 2.05 (2 df) $M^2 = 1.02$; $F = 8.14$; (**$p = <0.001$**)	Rural	153	2.21	0.35		
	Peri-urban	107	2.17	0.35	$T = 0.19$	
	Urban	109	2.03	0.36	**$T < 0.001$**	**$T = 0.015$**
TUGS community/social/health K–W chi-sq = 30.51; 2 df (**$p < 0.001$**)	Rural	153	2.36	0.34		
	Peri-urban	107	2.27	0.35	$U = 0.05$	
	Urban	109	2.10	0.37	**$U < 0.001$**	**$U = 0.001$**
TUGS house and home K–W chi-sq = 4.92 ($p = 0.09$)	Rural	153	2.13	0.45		
	Peri-urban	107	2.17	0.40		
	Urban	109	2.05	0.44		
TUGS nuclear family 6 items K–W chi-sq = 4.49 (2 df) ($p = 0.11$)	Rural	153	2.06	0.88		
	Peri-urban	107	1.93	0.97		
	Urban	109	1.86	0.88		

	Asset index	*N*	Mean	SD
TUGS scale $t = -4.26$ (367 df) (**$p < 0.001$**)	Poor	103	2.02	0.35
	Non-poor	266	2.19	0.36
TUGS community/social/health $U = 12{,}089.0$ ($p = 0.08$)	Poor	103	2.21	0.36
	Non-poor	266	2.27	0.37
TUGS house and home $U = 7{,}812.0$ (**$p < 0.001$**)	Poor	103	1.88	0.42
	Non-poor	266	2.21	0.40

Table 9 continued

	Asset index	*N*	Mean	SD
TUGS nuclear family $U = 12{,}402.5$ ($p = 0.16$)	Poor	103	1.90	0.86
	Non-poor	266	1.99	0.93

	Needs deprivation index ($n = 219$)		Household resources ($n = 211$)	
Spearman's rank correlation *r*	*r*	*p*	*r*	*p*
TUGS scale	−0.08	0.26	**0.17**	**0.01**
TUGS community/social/health	0.00	0.98	0.10	0.13
TUGS house and home	0.15	0.025	**0.24**	**0.001**
TUGS nuclear family	0.03	0.69	0.00	1.00

Scale/subscale score and between-group comparisons* Individualised scores	Region of Thailand	*N*	Mean	SD	*p* value of post hoc Tukey HSD (*T*); Mann–Whitney *U* for subscales
TIGA scale $t = -5.15$ (367 df) (**$p < 0.001$**)	Northeast	184	3.42	0.84	
	South	185	3.87	0.86	
TIGA community/social/health $U = 12{,}784.0$ (**$p < 0.001$**)	Northeast	184	3.51	0.95	
	South	185	3.90	0.94	
TIGA house and home $U = 10{,}721.5$ (**$p < 0.001$**)	Northeast	184	3.28	0.89	
	South	185	3.90	0.94	
TIGA nuclear family $U = 14{,}133.0$ (**$p = 0.005$**)	Northeast	184	3.40	1.75	
	South	185	3.80	1.86	

	Religion	*N*	Mean	SD
TIGA scale $t = 3.28$ (367 df) (**$p = 0.001$**)	Muslim	99	3.89	0.88
	Buddhist	270	3.56	0.86
TIGA community/social/health $U = 10{,}563$ (**$p = 0.002$**)	Muslim	99	3.95	0.91
	Buddhist	270	3.61	0.96
TIGA house and home $U = 10{,}447.5$ (**$p = 0.001$**)	Muslim	99	3.88	1.01
	Buddhist	270	3.48	0.93
TIGA nuclear family $U = 11{,}882.5$ ($p = 0.10$)	Muslim	99	3.79	1.94
	Buddhist	270	3.53	1.76

	Site type	*N*	Mean	SD	Rural	Peri-urban
TIGA scale ss = 16.861 (2 df) $M^2 = 8.43$; $F = 11.60$; (**$p = <0.001$**)	Rural	153	3.85	0.88		
	Peri-urban	107	3.66	0.88	$T = 0.19$	
	Urban	109	3.37	0.78	**$T < 0.001$**	**$T = 0.015$**
TIGA community/social/health K–W chi-sq = 28.66; 2 df (**$p < 0.001$**)	Rural	153	3.97	0.97		
	Peri-urban	107	3.71	0.95	$U = 0.08$	
	Urban	109	3.32	0.83	**$U < 0.001$**	**$U = 0.001$**
TIGA house and home K–W chi-sq = 9.70 (**$p = 0.008$**)	Rural	153	3.68	0.97		
	Peri-urban	107	3.71	0.98	$U = 0.71$	
	Urban	109	3.35	0.92	**$U = 0.008$**	**$U = 0.005$**

Table 9 continued

	Site type	*N*	Mean	SD	Rural	Peri-urban
TIGA nuclear family 6 items K–W chi-sq = 7.03; 2 df ($p = 0.03$)	Rural	153	3.88	1.73		
	Peri-urban	107	3.43	1.93		
	Urban	109	3.37	1.76		

	Asset index	*N*	Mean	SD	
TIGA scale $t = -2.633$(67 df) (**$p = 0.009$**)	Poor	103	3.45	0.88	
	Non-poor	266	3.72	0.87	
TIGA community/social/health $U = 11{,}873.5$ ($p = 0.05$)	Poor	103	3.55	0.98	
	Non-poor	266	3.76	0.95	
TIGA house and home $U = 10{,}331.0$ (**$p < 0.001$**)	Poor	103	3.29	0.91	
	Non-poor	266	3.71	0.97	
TIGA nuclear family $U = 13{,}028$ ($p = 0.46$)	Poor	103	3.55	1.70	
	Non-poor	266	3.71	3.62	1.86

Spearman's rank correlation *r*	Needs deprivation index ($n = 219$)		Household resources ($n = 211$)	
	r	*p*	*r*	*p*
TIGA scale	0.00	0.97	0.16	0.02
TIGA community/social/health	0.02	0.73	0.14	0.047
TIGA house and home	−0.04	0.54	**0.23**	**0.001**
TIGA nuclear family	0.06	0.41	−0.01	0.87

* ANOVA/*t*-test; Kruskal–Wallis (KW)/Mann–Whitney *U*: Bonferroni correction for 4 tests in each block: $p < 0.01$ accepted for multiple comparison tests and $p < 0.008$ for post hoc tests (bold)

trends were found for individualised scores: *TIGA scale* scores ($t = -3.98$; 168 df ($p < 0.001$), *community/social/health* scores ($U = 6{,}268.5$, $p = 0.006$) and *house and home* ($U = 4{,}697.0$, $p < 0.001$) but not *nuclear family*, which just missed significance according to the Bonferroni correction ($U = 6{,}624.5$, $p = 0.03$). On the other hand, there was no significant difference between the scores of Muslims and Buddhists in the South for unweighted scores (*TUGS* scale $t = -0.64$, $p = 0.52$; *community/social/health* $U = 4{,}148.0$, $p = 0.76$; *house and home* $U = 3{,}974.5$, $p = 0.44$; *nuclear family* $U = 4{,}252.0$, $p = 0.99$) or individualised scores (TIGA scale $t = 0.30$,136 df, $p = 0.77$; *community/social/health* $U = 4{,}004.0$, $p = 0.48$; *house and home* $U = 4{,}091.5$, $p = 0.65$; *nuclear family* $U = 4{,}203.5$, $p = 0.88$). This confirmed the difference as regional rather than religious. Those in urban locations had poorer *TUGS* and *TIGA* scale scores and *community/social/health scores* (and *TIGA house and home* scores) than those in rural and peri-urban areas. Again, there was no significant difference in the *nuclear family* scores. A confounding factor is that in the South, people were sampled in equal proportions (1:1:1) from rural, peri-urban and urban settings, whereas the proportions in the Northeast were 2:1:1 as there was an extra rural site. Moving to the economic indicators, and using the two categories defined by the Asset Index (Table 9), 'poor' people scored significantly lower than 'non-poor' people on both the *TUGS* and *TIGA* scales and *house and home* subscales ($p < 0.01$), but there was no significant difference in *community/social/health* scores or *nuclear family* scores. This is unsurprising, since the Asset Index refers to the same sort of possessions that are included in the *house and home* subscale. The Needs Deprivation

Index did not correlate significantly with either the *TUGS* or *TIGA* scores and the correlation coefficients were all $r < 0.1$. The correlations between Household Resources and the *TUGS* and *TIGA scale*, and subscale scores were rather small, even though some were significant. Whilst *TUGS* total scores correlated $r = 0.17$ ($p = 0.01$) with Household Resources, this correlation missed significance for the *TIGA* scale ($r = 0.16$, $p = 0.02$, Bonferroni correction accepting 0.01). Only the correlation with the *house and home* subscale exceeded 0.2 ($p < 0.001$ for both unweighted and weighted scores).

Two multiple linear regressions were conducted: the first with *TUGS* scale scores as the dependent variable and the second with *TIGA* scale scores as the dependent variable. In each case, the sociodemographic, geographic/location and economic characteristics that proved to be significantly related to scale scores in the univariate analyses above (Tables 8, 9) were entered as a block, since there was no prior justification for the relative importance of the various predictors. Independent predictors were age (dichotomised as under 25 and 25+, because this was where the significant difference lay in univariate analyses), marital status (dichotomised married/not married, because the significant difference was found between married and other categories), region (Northeast/South), location (dichotomised because urban locations had significantly lower scores than either rural or peri-urban into urban coded 2/non-urban coded 1) and household resources, which was significantly correlated with *TUGS* but not *TIGA* scale scores, yet is included here for both unweighted and individualised analyses, so that the two models can be compared. Table 10 displays unstandardised regression coefficients (B) and their standard error (SE B), as well as standardised (β) regression coefficients and collinearity statistics. For both *TUGS* and *TIGA*, the independent predictors entered were identical and examination of correlations between predictor variables revealed that only two exceeded 0.16: These were the correlation between location (urban/non-urban) and household resources ($r = 0.43$) indicating that those in urban settings tended to have greater household resources, and the correlation between age category (below/above 25) and marital status (married or not) ($r = -0.36$) indicating that the younger category was less likely to be married. However, collinearity tolerance values were all >0.1 and VIF values were <10, indicating that there was no collinearity between the predictor variables and so all could be included in the subsequent analyses (Field 2005). This applied also to subsequent analyses, as shown in Table 10.

The first model predicting *TUGS* scores had better predictive value than that predicting *TIGA* scores (adjusted $R^2 = 0.23$ for *TUGS* compared with 0.17 for *TIGA* scores). In both cases, marital status, region and location were significant predictors, but only in the case of *TIGA* scores was age category (under/over 25) a significant predictor. As a check, the same regression analyses were run again with age in years as a continuous variable, but for neither *TUGS* nor *TIGA* was age in years a significant predictor, indicating that the association was not linear. In neither case was household resources a significant predictor and so this is excluded from the next model for both *TUGS* and *TIGA*.

Regression was conducted again for both dependent variables (*TUGS* and *TIGA* scale scores), with marital status, region and location as independent variables, but including also age category (under/over 25) for *TIGA* scores (shown as model 2 for each score in Table 10). The predictive value improved in both cases (to adjusted $R^2 = 0.28$ and 0.21 respectively) and all independent variables contributed significantly to the model. Thus, better quality of life on the *TUGS* scale was predicted by being married, living in the south and in a non-urban location (all $p < 0.001$). The same three variables predicted *TIGA* scale

Table 10 Summary of regression analysis for variables predicting *TUGS* and *TIGA* scores

Model		Unstandardised coefficients		Standardized coefficients beta	*t*	Sig.	Collinearity statistics	
		B	SE				Tolerance	VIF
TUGS 1	(Constant)	1.592	0.178		8.938	0.000		
Adjusted $R^2 = 0.23$	Age under/over 25	0.129	0.073	0.115	1.772	0.078	0.863	1.159
SE 0.31	Married or not	0.231	0.052	0.289	4.400	0.000***	0.846	1.182
SS 6.58 (5 df)	Region of country	0.174	0.044	0.245	3.953	0.000***	0.954	1.049
M^2 1.32	Site type urban or not	−0.140	0.053	−0.180	−2.657	0.008**	0.801	1.248
$F = 13.62$ ($p < 0.001$)	Household resources	0.027	0.017	0.107	1.569	0.118	0.794	1.260
TUGS 2	(Constant)	1.876	0.068		27.736	0.000		
Adjusted $R^2 = 0.28$	Married or not	0.288	0.034	0.381	8.457	0.000	0.969	1.032
SE 0.31	Region of country	0.189	0.033	0.262	5.804	0.000	0.965	1.036
SS 13.64 (3 df)	Site type urban or not	−0.157	0.035	−0.199	−4.444	0.000	0.981	1.019
M^2 4.55								
$F = 48.25$ ($p < 0.001$)								
TIGA 1	(Constant)	2.337	0.462		5.054	0.000		
Adjusted $R^2 = 0.17$	Age under/over 25	0.464	0.189	0.167	2.462	0.015*	0.863	1.159
SE 0.81	Married or not	0.324	0.136	0.163	2.382	0.018*	0.846	1.182
SS 31.05 (5 df)	Region of country	0.384	0.114	0.217	3.366	0.001**	0.954	1.049
M^2 6.21	Site type urban or not	−0.415	0.136	−0.214	−3.044	0.003**	0.801	1.248
$F = 9.52$ ($p < 0.001$)	Household resources	0.062	0.045	0.097	1.369	0.172	0.794	1.260
TIGA 2	(Constant)	2.650	0.269		9.859	0.000		
Adjusted $R^2 = 0.21$	Age under/over 25	0.367	0.126	0.145	2.926	0.004	0.872	1.147
SE 0.78	Married or not	0.403	0.092	0.219	4.365	0.000	0.847	1.180
SS 62.73 (4 df)	Region of country	0.428	0.082	0.245	5.196	0.000	0.965	1.037
M^2 15.68	Site type urban or not	−0.460	0.090	−0.240	−5.128	0.000	0.977	1.024
$F = 25.93$ ($p < 0.001$)								

* $p < 0.05$; ** $p \leq 0.01$, *** $p < 0.001$

scores, with the addition of being older than 25, which was a slightly less strong predictor ($p = 0.004$).

5 Discussion

The WeDQoL-Goals-Thailand is an acceptable and sensitive measure, which is readily completed at interview, despite its length. In future, the number of items can be reduced to 44. The fact that there was no consensus regarding the necessity of aspects of life for individual wellbeing indicates that a weighting process needs to incorporate the individual rather than the group perspective in generating scores that might reflect quality of life. QoL instruments that are developed only to include areas that are universal do not require scores to be weighted by importance, as items are selected on the basis that they are all important (Trauer and Mackinnon 2001). Universal measures may be parsimonious, but this might be at the expense of the deletion during development of items that help explain individual QoL. The lack of consensus concerning what areas are necessary herein suggests that an individualised approach is required. This does not mean that necessity and satisfaction are completely unrelated. The significant correlation between average necessity and satisfaction item scores indicates that people in general tend to be more satisfied with the aspects of life they consider to be most necessary, which may be psychologically adaptive. However, this referred only to averages—there was a range of necessity ratings and of satisfaction ratings for every item.

The weighting of goal satisfaction scores by their perceived necessity provided the basis for a single scale that may be considered to reflect the overall quality of life of the individual on their own terms, as well as subscales providing greater detail. This mirrors well the person-centred approach taken by WeD, which explores the considerable diversity in aspirations and experiences between the WeD countries, communities, and men, women, and children within those communities. The scale and subscales all have good internal consistency reliability and can be used to compare subgroups and/or the same communities over time.

When administered by interview, no items were missed from the WeDQoL-Goals-Thailand, indicating its acceptability to respondents from a wide range of ages, demographic backgrounds and geographical areas. The high completion rate may reflect Thai culture and the way people respond to interviewers, whom they perceive as having a higher education and thus status. Although interviewer feedback revealed that seven items needed explanation or were confused with other items, the exclusion of these items still left 44 items that were well understood and covered a broad range of aspects of life, without repetition or confusion. The subsequent evaluation focused on these items.

The 44 goal necessity and goal satisfaction items each yielded scores across the range of options, indicating potential sensitivity of all retained items to differences between individuals. The Unweighted Goal Satisfaction scores can usefully be considered as individual items. Satisfaction with each separate aspect of life can be tracked over time, perhaps after changes in government or in service provision. For example, in 2005, only 56.4% were satisfied with their *water*, yet this was an aspect of life perceived generally necessary for wellbeing. This could potentially be a target for financial investment and change. On a more personal and social plane, some Thailand-specific items reflect values embedded in Thai culture, which are outside the realms of government service provision. Nobody admitted having no *metta-karuna* (loving-kindness) for others and no-one said they were

not *satisfied with what you have*, reflecting the fact that having loving-kindness and being satisfied are both highly prized personal characteristics in Thailand. They represent two of the five Buddhist 'precepts' or commandments, alongside not taking life, drinking, or engaging in sexual misconduct, and importantly were valued also by Muslims in our sample.

Thai Unweighted Goal Satisfaction can be scored as a single *TUGS* scale (from all 44 items), and/or three subscales, all of which have excellent internal consistency reliability, but this does not take into account the individual perspective on wellbeing. The necessity ratings revealed that judgements about the importance of aspects of life may include considerable focus on community and family relationships, and on core Thai values such as behaving well, teaching what you know to others, respect, and having *metta-karuna* for others (Mulder 2000). These attributes that a government cannot provide and money cannot buy, were held in high regard by Thai people interviewed in 2005, and appeared to contribute more to their wellbeing than many basic and luxury goods. The questionnaire would not have had face validity for some respondents without these culture-specific items. Some placed no value on particular worldly goods. For example, 14% thought a telephone 'unnecessary' whilst 34% thought it 'very necessary' for their wellbeing. By weighting goal satisfaction by the value attached to each aspect of life and by allowing people with different beliefs to exclude items from their quality of life evaluation, the *Thai Individualised Goal Attainment* (*TIGA*) scores can reflect this wide range of personal priorities. The psychometric analyses found a single *TIGA* scale and three subscales (*community/social health*; *house and home*; *nuclear family*). The less-than-perfect correlation between unweighted *TUGS* scale score and individualised *TIGA* score shows that weighting items for perceived necessity and excluding those considered unnecessary does generate a quality of life score with an individual perspective, rather than simply inflating everyone's scores equally.

There is no 'gold standard' measure of quality of life, though some measures have been used in several countries and cultures. The generic SWLS (Diener et al. 1985) is one such measure and correlations with WeDQoL-Goals-Thailand scale scores were much as expected. The unweighted *TUGS* scale score correlated more strongly with the total SWLS score than did the individualised *TIGA* scale score and neither correlation was strong (below 0.5). This is entirely as expected—by asking respondents to focus on specific aspects of life and rate satisfaction (unweighted scores), then to indicate how important these are to them (weighted scores) and to discount irrelevant aspects of life (individualised scores), respondents are forced to move away from the broad perspective of generic measures ('taking your life as a whole, etc.'), which may be more likely to be influenced by cognitive dissonance, social desirability responding, efforts to protect self-esteem, and situational factors (Schwarz and Strack 1999).

The subscale structure of the WeDQoL-Goals-Thailand measure was similar, whether goal satisfaction scores were weighted or not, indicating that the necessity scores were not markedly distorting the structure. Only two items loaded differently, however, one of these (*living environment*) would appear to belong logically in either the *community/social/health* arena or the *house and home* arena, depending on how it is interpreted (immediate or wider living environment) and it may be wise to review the wording of this item in future. Also, *being satisfied with what I have* may be seen as reflecting reality (the quality of one's house, home and possessions) or a socially acceptable way of presenting oneself in Thai society, regardless of one's wealth, which has effects on how one is perceived in the community. The inclusion of the *health* and *healthcare access* items in the *community/social/health* subscale is interesting and may reflect the view that 'health' is not seen as an

individual matter in Thailand, but as a community issue or a matter of healthcare provision, similar to the provision of public transport and education, which also appear in this subscale. However, the reason could relate also to the translation of the word 'health' to the Central Thai phrase '*sukha pap*' or '*happy body*', which is the word used by healthcare professionals, rather than reflecting a more holistic view of health and well-being. It also may reflect that one of the major public debates in Thailand over recent years has been around a radical reorganisation of public healthcare provision. The *house and home* subscale has a fairly coherent content, though the items concerning *personal progress and owning a business or shop* fit less well than the others, both in terms of their meaning and in terms of their contribution to the internal consistency reliability of the subscale. Future psychometric evaluation may reveal that these two items might be better removed from the subscale and analysed separately, where they might be more informative. The *nuclear family* subscale has very coherent content and excellent internal consistency reliability, considering the small number of items included. However, it does by its nature yield lower scores for young, unmarried people, who scored lower than their elders on this subscale, both in the unweighted and individualised scoring method.

When the goal satisfaction scores were individualised, the means of the three subscales (*community/social/health*; *house and home*; *nuclear family*) were fairly similar, but all three demonstrated a considerable range. Although the individualised scale was normally distributed, and two approximated normal distribution, the unusual distribution of *Thai Individualised Goal Attainment nuclear family* subscale scores may be explained by the generally accepted importance of these aspects of life, but the changes in attainment of such goals at different times of life. For example, young people under 25 years of age agreed that these aspects of life were necessary, yet most did not yet have their own family. Although this discrepancy may not have affected their present quality of life if they were confident that they would have children in the future, it did affect their *TIGA* scores. Thus, the *TIGA* scale score will be artificially reduced for young unmarried people. The use of subscales may be advisable for some purposes, particularly since inclusion of nuclear family items in the single scale distorts scores because items included in the nuclear family subscale are linked to particular stages in the life course.

Whilst men tended to report somewhat better quality of life than did women in the *community/social/health* arena, no gender comparisons survived the Bonferroni correction. Whereas quality of life as operationalised in the *TIGA* scale scores was generally better for people who were married or in a life partnership, there were no differences in *community/social/health* aspects of life, which may be because the community support available through formal and informal social networks such as extended kin or village-based 'produce groups' is as significant as that provided by a spouse (Jongudomkarn and Camfield 2006). However, there was significant difference between married and widowed people according to unweighted *TUGS* scores. The necessity ratings may account for this, with widowed people considering the community to be more important to them.

There were clear differences between subgroups defined by geography, religion and location. With the exception of the *nuclear family* arena, quality of life was generally better in the South than the Northeast (even amongst Buddhists), better for Muslims than for Buddhists, and better for those in rural and peri-urban environments than those living in urban settings. However, the difference between religions was revealed to be an artefact of the Northeast/South division. The multivariate linear regression analysis showed that better quality of life on the *TIGA* scale was predicted by being older, married, living in the South and in a non-urban location. The age differences reflect both the way people's aspirations change as they age, often adapting to match their material circumstances and position in

society, and an increase in access to a range of resources as their household 'matures' (Sen 1984; Ruta et al. 2007). 'Marriage', denoting a partnership blessed by a monk or Iman, is also valued and, alongside higher education, is one of the main aspirations that parents have for their children, even though the quality of the experience of individual marriages may vary. The regional differences are largely economic and reflect historical differences in income, natural resources, and infrastructure provision between the Northeast and the other Thai regions (for example, the Northeast is currently home to a third of the people beneath the Thai government's poverty line and has a history of social disruption as a result of widespread migration). Thai people living in both rural and urban areas often perceive urban life as alienated and physically uncomfortable, due to overcrowding and poor provision of basic utilities. Rural life is idealised at all levels of Thai development discourse, which is reflected in the fact that the majority of urban residents aspire to return to their villages and maintain strong links by contributing to seasonal events such as festivals and rice harvesting.

WeDQoL *TIGA* scores related to economic variables much as expected. Using the Assets Index, 'poor' people scored significantly lower than 'non-poor' people on the *TUGS* and *TIGA* scales and *house and home* subscales. The correlations between Household Resources and the same three scores were small but were significant, particularly for the *house and home* subscale, which is to be expected, since the items in this subscale related to individualised satisfaction with aspects of the home. Neither economic indicator was related to scores in the *nuclear family* subscale. The significant relationships with these measures of poverty and resources thus provide good evidence of construct validity of the *TUGS* and *TIGA* scores. Nonetheless, the relationships were not perfect, as indicated by the rather small correlation coefficients, demonstrating that quality of life overall is not directly related to available finances and resources, and highlighting the importance of obtaining the individual perspective on life. These economic variables did not significantly predict *TUGS* and *TIGA* scale scores when put into multiple regression models, but this may relate to a Northeast/South difference in prosperity, which was already reflected in the 'region' variable. The Needs Deprivation Index did not correlate with the *TIGA* scores, which may reflect the following: firstly, basic needs are satisfied in many parts of Thailand and 'met' needs are rarely reported; secondly, where these are not satisfied, many people have adapted and take an almost fatalistic perspective, supported by their religious beliefs (this is less true of the younger generation); and thirdly, the variables measured in the Needs Deprivation Index mainly relate to infrastructure, which is not true of the majority of the goals items in the WeDQoL-Goals-Thailand measure.

The high rank correlation of 0.96 between the 44-item score that included items considered unnecessary (weighted goal satisfaction) and the 44-item individualised scale score (*TIGA*) which excluded items considered unnecessary by the individual shows that such exclusion does not distort the overall quality of life ratings obtained; the scores are in a similar rank order whether items are excluded or not. On the other hand, the exclusion of aspects of life unnecessary to an individual's quality of life is in keeping with the notion that the WeDQoL-Goals-Thailand measure provides a 'menu' from which respondents can choose aspects of life important to them, rather than having an external definition of quality of life imposed upon them by the questionnaire itself. Some of these 44 items (denoted with a 'c' prefix) have been used in other countries. When considering how the quality of life in different countries might be compared, it could be argued that measures made up of different items in the different countries, but weighted for individual importance, could provide comparable scores, each culturally and personally relevant. However, caution should be exercised when making comparisons between scores gathered in different

cultures, even if the same measure is administered in different countries after careful translation. Cultural differences in responding (Woodcock and Bradley 2006) may generate scores that are less directly related to different subjective experiences. A higher score in one country may not be indicative of a better quality of life than is experienced in another. It may merely reflect a greater propensity in that culture to respond positively to questions. It seems unlikely that cultural differences in responding were responsible for differences found between *TIGA* scores of Muslims and Buddhists, because Buddhists in the South had higher scores than Buddhists in the Northeast and the scores of Muslims and Buddhists in the South were similar, pointing instead to a regional difference.

TUGS and *TIGA* scores will therefore be extremely useful in evaluating the quality of life of Thai people in different living situations and over time, without responses being confounded by their religion. On the other hand, whilst there is potential for investigating differences between countries using individualised scores obtained in different countries, particularly scores generated from the same items administered in translation, any results should be treated with caution.

Even though individualised scores have intrinsic appeal, in that they give credit to the individual person's views, they do require greater effort for the researcher. The question therefore remains as to whether the process of weighting and individualization to compute the *TIGA* scores is worth the additional effort. Certainly, both the necessity and satisfaction scores are useful in their own right, and there will be value in tracking changes in both over time. However, the *TUGS* and *TIGA* scale scores appeared to produce essentially similar results in this study, even though the subscale structure was very slightly different. Unweighted and individualised scores differed in a broadly similar way between sociodemographic, geographic and economic subgroups. Multiple regression revealed that both were influenced by the same factors (marital status, region and urban location), although the individualised score was also influenced by age (being under or over 25). This finding, as explained above, is likely to lie in the high importance placed on family matters, which are not yet entirely relevant to young people who are not yet at the head of a family.

As described in the introduction, individualised measures assume that quality of life is determined by the gap between people's expectations and experiences, but acknowledge that as 'universal' items are not equally valued, respondents should nominate the areas they consider important and assess their performance against their own standards. Whilst weighting QoL scores by the perceived importance of the area has been criticised on statistical grounds (e.g. Trauer and MacKinnon 2001; Russell et al. 2006), comparisons of weighted and unweighted scores in this paper and elsewhere demonstrate that weighting provides valuable additional information (see also Skevington et al. 2004; Ring et al. 2005) without adversely affecting reliability (Macduff and Russell 1998). For this reason, weighting by importance cannot be seen as a weakness in statistical terms, especially as much of the debate over weighting focuses on the advantages and disadvantages of particular methods, for example, multiplicative scoring (Wu and Yao 2006; Hsieh 2003, 2004).

One of the main arguments for weighted measures is that respondents like them; they appreciate the fact that measures are flexible and person-centred and in many ways resemble the participatory methods more commonly used in development research (White and Pettit 2005). Weighted measures also provide a direct operationalisation of the popular gap theory of quality of life (Calman 1984), which is experiencing a renaissance due to a growing interest in social comparison and adaptation on the part of economists. Judging by similar analyses from use of the WeDQoL in Bangladesh, Ethiopia and Peru, weighted measures work well cross-culturally, if sensitively translated and carefully piloted. The

WeDQoL also benefits from its development within a more representative sample of the population than is normally the case in cross-cultural validation. Finally, while weighted measures are more time-consuming to administer than global ones, they are quicker than a semi-structured interview, which was previously the only way of attaining a similar degree of person-centredness.

6 Conclusion

The psychometric properties of the WeDQoL-Goals-Thailand are excellent: of the original 51 items, 44 can be used to provide an unweighted goal satisfaction scale and three subscales as well as an individualised scale and three subscale scores that reflect each person's unique perspective on wellbeing. These *Thai Unweighted Goal Satisfaction* (*TUGS*) and *Thai Individualised Goal Attainment* (*TIGA*) scores are sensitive to differences between socio-economic, geographic and economic subgroups and are likely to be useful in tracking changes over time. Whilst the individualised scores have intrinsic appeal, the findings obtained did not differ notably from those obtained with the unweighted scores. The additional effort in computing individualised scores may not therefore be justified in future studies.

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