Quality of Life Survey 6 2020/21

QUALITY OF LIFE SURVEY 6 (2020/21)

QUALITY OF LIFE INDEX METHODOLOGY

SEPTEMBER 2021

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GCRO Quality of Life Survey 6 (2020/21): Quality of Life Index methodology

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Date: September 2021

Type of output: Technical report

Research theme: Understanding quality of life

Cover image: Clive Hassall

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Published by the Gauteng City-Region Observatory (GCRO), a partnership of the University of Johannesburg, the University of the Witwatersrand, Johannesburg, the Gauteng Provincial Government and organised local government in Gauteng (SALGA).

Suggested citation: Naidoo, Y., & de Kadt, J. (2021). *Quality of Life Survey 6 (2020/21): Quality of Life Index methodology*. Johannesburg: Gauteng City-Region Observatory (GCRO).

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1. Introduction

Since the inception of the Gauteng City-Region Observatory's (GCRO) Quality of Life (QoL) Survey, the Quality of Life Index (QoL Index) has been a valuable tool – providing a single, encompassing indicator of the quality of life of Gauteng residents, and how this is changing over time. The original QoL Index combined 58 variables, aggregated into ten dimensions, which were in turn aggregated into a single overall score ranging from zero to ten. The variables selected for inclusion were underpinned by an understanding of overall quality of life as a multidimensional concept, shaped by both objective and subjective factors (Everatt, 2017).

As part of the GCRO's ten-year technical review of the QoL Survey, started in late 2018, a revised approach to the calculation of the QoL Index was developed (Orkin, 2020; Katumba et al., under review). This revised QoL Index draws on a subset of 33 of the previous 58 variables, using weights derived from the data to aggregate them first into seven dimensions, and then into a single score out of 100. Selection of variables and dimensions, along with the derivation of weights, is based on a series of exploratory factor analyses (EFA) applied to the QoL V (2017/18) Survey dataset. It was subsequently validated through confirmatory factor analysis (CFA) using the QoL V (2017/18), QoL IV (2015/16) and QoL III (2013/14) surveys.

This document provides some methodological detail regarding:

- The development, calculation and validation of the revised QoL Index that occurred during the ten-year review (Section 2); and
- The procedure followed for the calculation of the GCRO QoL Index using the QoL 6 (2020/21) Survey data (Section 3).

Please note that all content released by the GCRO in relation to the QoL 6 (2020/21) Survey launch event, including the Overview Report (de Kadt et al., 2021) and the COVID-19 Data Brief (Maree et al., 2021) make use exclusively of the revised QoL Index, for all survey iterations. Scores obtained using the revised QoL Index are not directly comparable to QoL Index scores reported in previous GCRO outputs.

For any further information on QoL Index development, calculation or use, please contact the GCRO at info@gcro.ac.za.

2. Development and validation of the QoL Index

2.1 Motivation for the redevelopment of the QoL Index

The ten-year review of the Quality of Life Survey project yielded a number of recommendations for the GCRO (Orkin, 2020). Key amongst these was the urgent need to address questionnaire length, which had expanded over time. Various strategies to achieve this end were recommended, one of which was to reduce the number of variables feeding into the QoL Index, as this would reduce the number of questions that needed to be included in every survey iteration. In addition, it was suggested that Likert scale variables should be retained in their original form, rather than recoded as binary which entailed the loss of information. It was also advised that missing values be imputed

rather than set by default to a poor outcome. An extensive exploration of methodological literature, and approaches to quality of life indexing globally, suggested the adoption of a statistically guided approach to identifying the revised set of variables and dimensions, as well as generating the weights used in their aggregation (Orkin, 2020). Work to explore, refine and test an alternative approach to the QoL Index calculation was undertaken by two GCRO staff members (Samy Katumba and Dr Julia de Kadt) and two external statistical experts (Prof. Mark Orkin and Prof. Paul Fatti).

2.2 Identification of dimensions and variables

The previous QoL Index made use of 58 variables to create ten dimensions. These variables encompassed both objective and subjective components of quality of life. Objective measures included, for example, basic living conditions and income, while subjective measures included satisfaction with various aspects of life, services and government.

As the 58 variables used in the original QoL Index had been identified through extensive engagement with relevant literature, and were available across all survey iterations, they variables were used as a starting point in the generation of the new QoL Index. Based on consultation within the GCRO, three additional, longitudinally available variables were added, while the variable based on 'satisfaction with life as a *whole'* was set aside to serve as a reference variable. This resulted in a set of 60 variables, which are provided in Appendix A.

QoL V (2017/18) was used for the initial work to identify variables and dimensions for inclusion. As the most recent survey iteration, the derived QoL Index structure would be likely to continue to work into the future. Additionally, its large sample size (n=24 889) was more than adequate for the analysis undertaken.

With the exception of household income and highest education level, each variable was retained in its original format – whether a dichotomy or a three- or five-point Likert scale. Income was recoded to a five-point scale and education level was recoded to a six-point scale. To ensure consistency, all variables were recoded such that the lowest score was the 'worst' outcome. Likert variables were further rescaled such that they started at zero for the 'worst' outcome rather than at one.

A small number of variables included missing data. These were categorised as either structurally missing (e.g. satisfaction with work for those not working, or satisfaction with relationship with spouse or partner for single people) or missing at random (e.g. where respondents declined to provide household income or made use of a 'don't know' response). Structurally missing responses were set to the midpoint of the applicable Likert scale. Values missing at random were imputed using an R package named 'missForest'. This package is specifically designed to correctly handle the imputation of categorical data, using a random forest trained on a data matrix (Stekhoven & Buehlmann, 2012).

Following the data preparation described, exploratory factor analysis (EFA) was used to identify the appropriate number of dimensions for retention, as well as their constituent variables. Given the categorical nature of the variables included, a polychoric correlation matrix was used, with weighted least squares as the factoring method. Oblique rotation was used to allow for correlation between dimensions. Various criteria were considered for the optimal number of dimensions to retain, of which the majority suggested seven dimensions as most appropriate. Within each dimension, the variables with the highest factor loadings were retained.

This process yielded a seven dimension, 33 variable model. A further EFA was run on these 33 variables only, to obtain refined factor loadings and eigenvalues for weighting. EFA was also used to determine the eigenvalues and factor loadings that were used in the construction of the dimensions and the overall QoL Index score.

2.3 Validation of the QoL Index

Confirmatory factor analysis (CFA) was used to test the fit of the revised seven dimension, 33 indicator model on the QoL V (2017/18) data. It was also applied to the same model for QoL IV (2015/16) and QoL III (2013/14). Results from this process – including root mean square error of approximation (RMSEA), comparative fit index (CFI) and standardised root mean squared residual (SRMR), indicated a good fit across all three datasets. The internal consistency of each dimension was further assessed by use of Cronbach's alpha, and all were deemed acceptable.

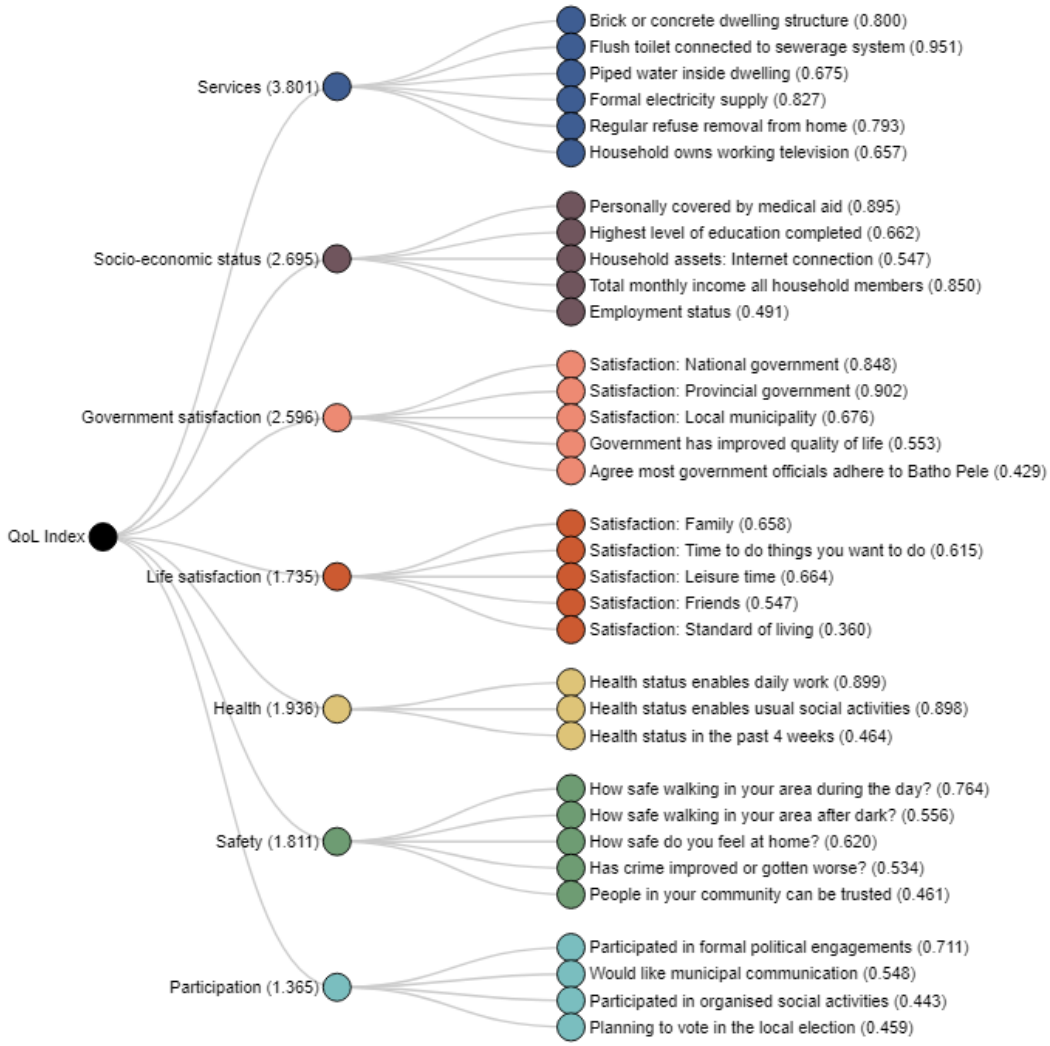
2.4 Dimensions and variables identified

As described above, seven dimensions were identified. The dimensions identified, and their eigenvalue as derived from the EFA, are as follows:

1. Services (3.801);
2. Socio-economic status (2.695);
3. Government satisfaction (2.596);
4. Life satisfaction (1.735);
5. Health (1.936);
6. Safety (1.811); and
7. Participation (1.365).

The tree diagram in Figure 1 below illustrates the variables comprising each of the dimensions. The factor loading for each variable is indicated in brackets after the variable name. The number of variables per dimension ranges from three to six, all with factor loadings greater than 0.35. For each dimension, the eigenvalue is included in brackets after its name.

Figure 1: Tree diagram showing the variables comprising each of the seven dimensions of the revised QoL Index. For variables, the factor loading is included in brackets, while for dimensions, the eigenvalue is included.



2.5 Calculation of dimension scores and overall QoL Index scores

Once the model derived using the QoL Survey V (2017/18) data was fully validated, QoL Index scores were calculated for each of the QoL III (2013/14), QoL IV (2015/16) and QoL V (2017/18) survey iterations. Scores are calculated at the level of the individual respondent in each dataset. The factor loadings from the QoL V (2017/18) EFA run on the 33 variables selected for retention were used for the weighting of variables across all survey iterations. Similarly, in the aggregation of the dimension scores into the final composite QoL Index value, the eigenvalues derived from the QoL V (2017/18) EFA were used for all survey iterations.

2.5.1Calculation of dimension scores

The dimension score is calculated by aggregating its constituent variables, as identified in Figure 1 above. Non-dichotomous variables are divided by the number of points on that variable's scale, to ensure consistent maximum and minimum scores across all variables. So, for example, a five-point Likert scale variable running from zero to four would be divided by four. Each variable is then weighted by its factor loading. These rescaled and weighted dimensions are then aggregated in a weighted fashion to calculate a dimension score out of ten.

Appendix B shows the SPSS syntax used to calculate each of the dimensions. The GCRO has used these dimension scores scaled to run from zero to 100 in all content associated with the QoL Survey 6 (2020/21) launch.

2.5.2Calculation of the overall QoL Index score

Once all dimension scores are calculated, the overall QoL Index score is calculated through weighted aggregation, with each dimension weighted by the appropriate eigenvalue. Then, using the eigenvalues of the dimensions and the final results of the dimensions, the overall QoL Index score is compiled. This aggregation is then divided by the sum of all eigenvalues and scaled to run from zero to 100.

3. Calculation of the QoL Index for the QoL Survey 6 (2020/21)

3.1 Variables used

Table 1, below, illustrates the variables comprising each dimension in the QoL Index and provides the relevant variable names in the QoL Survey 6 (2020/21) dataset. As described in Section 2 above, these variables were recoded and rescaled, and missing values were imputed in advance of the QoL Index calculation.

Table 1: The seven dimensions and 33 constituent variables of the QoL Index, along with the relevant variable names in the QoL Survey 6 (2020/21) dataset.

Dimension	Index variable label	Index variable description	QoL 6 (2020/21) variable(s)
Services	d3	Brick or concrete dwelling structure	a3_dwelling_type
	i3	Flush toilet connected to a sewerage system	q1_10_toilet_type
	i4	Piped water inside dwelling	q1_4_water
	i5	Formal electricity supply	q1_12_1_prepaid
			q1_12_2_postpaid
			q1_12_3_solar
			q1_12_4_generator
	i6	Regular refuse removal from home	q1_11_removal
	e4		q6_3_3_tv

Dimension	Index variable label	Index variable description	QoL 6 (2020/21) variable(s)
		Household owns working television	q6_3_5_radio
Socio-economic status	h5	Personally covered by medical aid	q13_5_medical_aid
	e2	Education level	q14_1_education
	e5	Household has working internet connection	q6_3_7_internet
	w5	Employment status	q10_4_unemployed
	w6	Monthly household income	q15_3_income
Government satisfaction	p6	Satisfaction: National government	q7_4_ng
	p7	Satisfaction: Provincial government	q7_5_pg
	p8	Satisfaction: Local municipality	q7_6_lg
	r5	Government has improved quality of life	q7_8_level_gov
	p9	Agrees most government officials adhere to Batho Pele	q7_9_batho_pele
Life satisfaction	f2	Satisfaction: Family	q9_3_family_time
	f3	Satisfaction: Time to do things you want to do	q9_2_time
	f4	Satisfaction: Leisure time	q9_7_leisure
	c2	Satisfaction: Friends	q9_5_friends
	w3	Satisfaction: Standard of living	q9_6_living
Health	h2	Health status enables daily work	q13_7_health_work
	h3	Health status enables usual social activities	q13_8_health_soc

Dimension	Index variable label	Index variable description	QoL 6 (2020/21) variable(s)
	h1	Health status in the past 4 weeks	q13_6_health_status
Safety	s1	Feels safe walking in local area during the day	q11_3_daytime_safety
	s2	Feels safe walking in local area after dark	q11_4_night_safety
	s3	Feels safe at home	q11_5_home_safety
	s4	Believes local crime situation is improving	q11_1_crime
	c1	Believes that most people in local community can be trusted	q4_3_community_trust
Participation	c4	Participated in organised social activities	q12_1_1_church q12_1_2_social q12_1_3_stokvel q12_1_4_community q12_1_5_political q12_1_6_other
	p10	Participated in formal political engagements	q12_2_1_ward q12_2_2_street q12_2_3_cdf q12_2_4_idp q12_2_5_mayor q12_2_6_sbg q12_2_7_cpf
	r4	Would like municipal communication	q7_12_munic_comm

Dimension	Index variable label	Index variable description	QoL 6 (2020/21) variable(s)
	p11	Planning to vote in the local election	q7_2_voted

3.2 Preparation of variables for the QoL Index calculation

3.2.1 Rescaling and recoding

Once the appropriate variables had been identified in the QoL Survey 6 (2020/21) dataset, they were recoded to ensure consistency within the dataset and consistency with datasets used in previous survey iterations. In some instances, multiple variables were used to generate a QoL Index variable, for example in the case of access to formal electricity or employment status, amongst others.

Following the recoding, any QoL Index variables that were not dichotomous (0/1), or otherwise did not have a base value of zero, were rescaled such that all variables had base values of zero to represent the 'worst' possible outcome. The following variables were rescaled: p6, p7, p8, f2, f3, f4, c2, w3, h1, h2, h3, e2, w6, s1, s2, s3, s4.

3.2.2 Imputation of missing values

Six QoL Index variables had missing values: p9, h5, e2, w5, w6 and c1. In all instances, these were treated as missing at random, and imputed using an R package named 'missForest'. This package is used to impute missing values for continuous and categorical data. It uses a random forest that is trained on a data matrix to impute the missing values (Stekhoven & Buehlmann, 2012).

3.3 QoL Index calculation

Dimension scores were calculated as per Section 2.5.1 above, with each dimension score ranging from zero to ten. In GCRO's reporting on the QoL 6 (2020/21) data, these scores have been further scaled to run from zero to 100.

The overall QoL Index score was calculated as per Section 2.5.2, to yield a score out of 100.

The SPSS syntax used in the calculation of the dimensions and the overall QoL Index in QoL 6 (2020/21) is available in Appendix B.

References

de Kadt, J., Hamann, C., Mkhize, S.P., & Parker, A. (Eds.). (2021). *Quality of Life 6 (2020/21) Survey: Overview report*. Johannesburg: Gauteng City-Region Observatory (GCRO).

Everatt, D. (2017). Quality of Life in the Gauteng City-Region, South Africa. *Social Indicators Research, 130*(1), 71–86. https://doi.org/10.1007/s11205-015-1127-y

GCRO (Gauteng City-Region Observatory). (2021). Quality of Life Survey 6 (2020/21) [Dataset]. Version 1. Johannesburg and Cape Town: GCRO & DataFirst. https://doi.org/10.25828/wemz-vf31

GCRO (Gauteng City-Region Observatory). (2019). Quality of Life Survey V (2017/18) [Dataset]. Version 1.1. Johannesburg and Cape Town: GCRO & DataFirst. DOI: https://doi.org/10.25828/8yf7-9261

GCRO (Gauteng City-Region Observatory). (2016). Quality of Life Survey IV (2015/16) [Dataset]. Version 1. Johannesburg and Cape Town: GCRO & DataFirst. https://doi.org/10.25828/w490-a496

GCRO (Gauteng City-Region Observatory). (2015). Quality of Life Survey III (2013/14) [Dataset]. Version 1. Johannesburg and Cape Town: GCRO & DataFirst. https://doi.org/10.25828/gn3g-vc93

Katumba, S., de Kadt, J., Orkin, M., & Fatti, P. (2021). A simple reflective construction of a quality of life index for LMICs – the example of Gauteng province in South Africa. Under review with *Social Indicators Research*.

Maree, G., Culwick Fatti, C., Götz, G., Hamann, C., & Parker, A. (2021). *Effects of the COVID-19 pandemic on the Gauteng City-Region: Findings from the GCRO's Quality of Life 6 (2020/21) Survey*. GCRO Data Brief No. 11. Johannesburg: Gauteng City-Region Observatory.

Orkin, M. (2020). *Technical review of the GCRO QoL surveys: Synthesis report*. Johannesburg: Gauteng City-Region Observatory.

Stekhoven, D.J., & Buehlmann, P. (2012). MissForest – nonparametric missing value imputation for mixed-type data. *Bioinformatics*, 28, 112–118. https://doi.org/10.1093/bioinformatics/btr597

Appendix A: Full list of variables considered for inclusion in the revised GCRO QoL Index

Variable	Label	Recoded/Rescaled as Likert scale or Binary	Missing values
Believes there has been an improvement in the community	i1	Likert scale (1 to 3/0 to 2)	No missing values
Water is usually/always clean	i2	Likert scale (1 to 5/0 to 4)	No missing values
Flush toilet connected to a sewerage system	i3	Binary (0 to 1)	No missing values
Piped water inside dwelling	i4	Binary (0 to 1)	No missing values
Formal electricity supply	i5	Binary (0 to 1)	No missing values
Regular refuse removal from home	i6	Binary (0 to 1)	No missing values
Has not had water/electricity cut off or been evicted	i7	Binary (0 to 1)	No missing values
Disagrees that politics is a waste of time	p1	Likert scale (1 to 5/0 to 4)	No missing values
Agrees that elections were/will be free and fair	p2	Likert scale (1 to 5/ 0 to 4)	No missing values
Agrees that judiciary is free from government influence	p3	Likert scale (1 to 5/0 to 4)	No missing values
Disagrees that Blacks and Whites will never trust each other	p4	Likert scale (1 to 5/0 to 4)	No missing values
Believes foreigners should be allowed to stay	p5	Likert scale (1 to 3/0 to 2)	No missing values

Variable	Label	Recoded/Rescaled as Likert scale or Binary	Missing values
Satisfaction: National government	p6	Likert scale (1 to 5/0 to 4)	No missing values
Satisfaction: Provincial government	p7	Likert scale (1 to 5/0 to 4)	No missing values
Satisfaction: Local municipality	p8	Likert scale (1 to 5/0 to 4)	No missing values
Agrees most government officials adhere to Batho Pele	p9	Binary (0 to 1)	'Never interact with government officials' treated as missing at random
Participated in formal political engagements	p10	Binary (0 to 1)	No missing values
Planning to vote in the local election	p11	Binary (0 to 1)	No missing values
Has not been asked for a bribe	p12	Binary (0 to 1)	No missing values
Satisfaction: Life as a whole	g1*	Likert scale (1 to 5/0 to 4)	No missing values
Disagrees that no-one cares about me	g2	Likert scale (1 to 5/0 to 4)	No missing values
Disagrees that I cannot influence developments	g3	Likert scale (1 to 5/0 to 4)	No missing values
Believes that the country is going in the right direction	g4	Likert scale (1 to 5/0 to 4)	No missing values
Satisfaction: Marriage/relationship	f1	Likert scale (1 to 5/0 to 4)	'No partner' responses set to neutral midpoint

Variable	Label	Recoded/Rescaled as Likert scale or Binary	Missing values
Satisfaction: Family	f2	Likert scale (1 to 5/0 to 4)	No missing values
Satisfaction: Time to do things you want to do	f3	Likert scale (1 to 5/0 to 4)	No missing values
Satisfaction: Leisure time	f4	Likert scale (1 to 5/0 to 4)	No missing values
Children did not skip a meal in the past year	f5	Binary (0 to 1)	No missing values
Believes that most people in local community can be trusted	c1	Binary (0 to 1)	'Don't know' responses treated as missing at random
Satisfaction: Friends	c2	Likert scale (1 to 5/0 to 4)	No missing values
Believes it is important to look after the environment	c3	Likert scale (1 to 5/0 to 4)	No missing values
Participated in organised social activities	c4	Binary (0 to 1)	No missing values
Health status in the past 4 weeks	h1	Likert scale (1 to 4/0 to 3)	No missing values
Health status enables daily work	h2	Likert scale (1 to 4/0 to 3)	No missing values
Health status enables usual social activities	h3	Likert scale (1 to 4/0 to 3)	No missing values
Was able to access healthcare	h4	Binary (0 to 1)	No missing values

Variable	Label	Recoded/Rescaled as Likert scale or Binary	Missing values
Personally covered by medical aid	h5	Binary (0 to 1)	'Don't know' responses treated as missing at random
Satisfaction: Dwelling	d1	Likert scale (1 to 5/0 to 4)	No missing values
Satisfaction with the area where you live	d2	Likert scale (1 to 5/0 to 4)	No missing values
Brick or concrete dwelling structure	d3	Binary (0 to 1)	No missing values
Has ownership of dwelling	d4	Binary (0 to 1)	No missing values
Dwelling is not overcrowded	d5	Binary (0 to 1)	No missing values
Believes that the Press is free to write/say what it likes	e1	Likert scale (1 to 5/0 to 4)	No missing values
Education level	e2	Likert scale (1 to 6/0 to 5)	'Unspecified' responses treated as missing at random
Has a telephone or cellphone	e3	Binary (0 to 1)	No missing values
Household owns working television	e4	Binary (0 to 1)	No missing values
Household has a working internet connection	e5	Binary (0 to 1)	No missing values
Satisfaction: Money available to respondent?	w1	Likert scale (1 to 5/0 to 4)	No missing values
Satisfaction: Standard of living	w3	Likert scale (1 to 5/0 to 4)	No missing values

Variable	Label	Recoded/Rescaled as Likert scale or Binary	Missing values
Satisfaction: Working conditions in your job	w4	Likert scale (1 to 5/0 to 4)	Missing responses for those not working set to neutral midpoint
Employment status	w5	Binary (0 to 1)	No missing values
Monthly household income	w6	Likert scale (1 to 5/0 to 4)	Respondent refusals treated as missing at random
Does not have debt	w7	Binary (0 to 1)	No missing values
Feels safe walking in local area during day	s1	Likert scale (1 to 5/0 to 4)	No missing values
Feels safe walking in local area after dark	s2	Likert scale (1 to 5/0 to 4)	No missing values
Feels safe at home	s3	Likert scale (1 to 5/0 to 4)	No missing values
Believes local crime situation is improving	s4	Likert scale (1 to 3/0 to 2)	No missing values
Has not been a victim of crime in the past year	s5	Binary (0 to 1)	No missing values
Length of time taken to reach your destination from home	r1	Likert scale (1 to 6/0 to 5)	No missing values
Would like municipal communication	r4	Binary (0 to 1)	No missing values
Believes that government has improved quality of life	r5	Binary (0 to 1)	No missing values

*

g1, 'Satisfaction: Life as a whole', was set aside to serve as a reference variable.

Appendix B: SPSS syntax

SPSS syntax for calculating dimensions

Calculation of Services dimension

Each variable assigned to this dimension is multiplied by its factor loading to create the components for calculating the dimension

```
COMPUTE d3_SL = d3*0.800.

COMPUTE i3_SL = i3*0.951.

COMPUTE i4_SL = i4*0.675.

COMPUTE i5_SL = i5*0.827.

COMPUTE i6_SL = i6*0.793.

COMPUTE e4_SL = e4*0.657.
```

The overall Services dimension value is calculated by adding the above values and dividing the result by the sum of the factor loadings of the variables

```
COMPUTE F1servic = (d3_SL+ i3_SL + i4_SL + i5_SL + i6_SL +
e4_SL)*10/(0.800+0.951+0.675+0.827+0.793+0.657).
```

Calculation of Socio-economic status dimension

Each variable assigned to this dimension is multiplied by its factor loading to create the components for calculating the dimension

```
COMPUTE h5_SL = h5*0.895.

COMPUTE e2_SL= e2*0.662/5. *This value is divided by five as it has a six-point Likert scale. The variable has been rescaled to a base of zero*

COMPUTE e5_SL = e5*0.547.

COMPUTE w6_SL = w6*0.850/4. *This value is divided by four as it has a five-point Likert scale. The variable has been rescaled to a base of zero*

COMPUTE w5_SL = w5*0.491.
```

The overall Socio-economic status dimension value is calculated by adding the above values and dividing the result by the sum of the factor loadings of the variables

```
COMPUTE F2soclas = ( h5_SL + e2_SL + e5_SL + w6_SL + w5_SL) * 10/(0.895 + 0.662 + 0.547 +
0.850 + 0.491).
```

Calculation of Government satisfaction dimension

Each variable assigned to this dimension is multiplied by its factor loading to create the components for calculating the dimension

COMPUTE p6_SL = p6*0.848/4. **This value is divided by four as it has a five-point Likert scale. The variable has been rescaled to a base of zero**

COMPUTE p7_SL = p7*0.902/4. **This value is divided by four as it has a five-point Likert scale. The variable has been rescaled to a base of zero**

COMPUTE p8_SL = p8*0.676/4. **This value is divided by four as it has a five-point Likert scale. The variable has been rescaled to a base of zero**

COMPUTE r5_SL = r5*0.553.

COMPUTE p9_SL = p9*0.429.

The overall Government satisfaction dimension value is calculated by adding the above values and dividing the result by the sum of the factor loadings of the variables

COMPUTE F3govsat = (p6_SL + p7_SL + p8_SL + r5_SL + p9_SL) * 10/(0.848 + 0.902 + 0.676 + 0.553 + 0.429).

****Calculation of Life satisfaction dimension****

Each variable assigned to this dimension is multiplied by its factor loading to create the components for calculating the dimension

COMPUTE f2_SL = f2*0.658/4. **This value is divided by four as it has a five-point Likert scale. The variable has been rescaled to a base of zero**

COMPUTE f3_SL = f3*0.615/4. **This value is divided by four as it has a five-point Likert scale. The variable has been rescaled to a base of zero**

COMPUTE f4_SL = f4*0.664/4. **This value is divided by four as it has a five-point Likert scale. The variable has been rescaled to a base of zero**

COMPUTE c2_SL = c2*0.547/4. **This value is divided by four as it has a five-point Likert scale. The variable has been rescaled to a base of zero**

COMPUTE w3_SL = w3*0.360/4. **This value is divided by four as it has a five-point Likert scale. The variable has been rescaled to a base of zero**

The overall Life satisfaction dimension value is calculated by adding the above values and dividing the result by the sum of the factor loadings of the variables

COMPUTE F4lifsat = (f2_SL + f3_SL + f4_SL + c2_SL +w3_SL) * 10/(0.658 + 0.615 + 0.664 + 0.547 + 0.360).

****Calculation of Health dimension****

Each variable assigned to this dimension is multiplied by its factor loading to create the components for calculating the dimension

COMPUTE h2_SL = h2*0.899/3. *This value is divided by three as it has a four-point Likert scale. The variable has been rescaled to a base of zero*

COMPUTE h3_SL = h3*0.898/3. *This value is divided by three as it has a four-point Likert scale. The variable has been rescaled to a base of zero*

COMPUTE h1_SL = h1*0.464/3. *This value is divided by three as it has a four-point Likert scale. The variable has been rescaled to a base of zero*

The overall Health dimension value is calculated by adding the above values and dividing the result by the sum of the factor loadings of the variables

COMPUTE F5health = (h2_SL + h3_SL + h1_SL) * 10/(0.899 + 0.898 + 0.464).

Calculation of Safety dimension

Each variable assigned to this dimension is multiplied by its factor loading to create the components for calculating the dimension

COMPUTE s1_SL = s1*0.764/4. *This value is divided by four as it has a five-point Likert scale. The variable has been rescaled to a base of zero*

COMPUTE s2_SL = s2*0.556/4. *This value is divided by four as it has a five-point Likert scale. The variable has been rescaled to a base of zero*

COMPUTE s3_SL = s3*0.620/4. *This value is divided by four as it has a five-point Likert scale. The variable has been rescaled to a base of zero*

COMPUTE s4_SL = s4*0.534/2. *This value is divided by two as it has a three-point Likert scale. The variable has been rescaled to a base of zero*

COMPUTE c1_SL = c1*0.461.

The overall Safety dimension value is calculated by adding the above values and dividing the result by the sum of the factor loadings of the variables

COMPUTE F6safety = (s1_SL + s2_SL + s3_SL + s4_SL + c1_SL) * 10/ (0.764 + 0.556 + 0.620 + 0.534 + 0.461).

Calculation of Participation dimension

Each variable assigned to this dimension is multiplied by its factor loading to create the components for calculating the dimension

COMPUTE p10_SL = p10*0.711.

COMPUTE r4_SL = r4*0.548.

COMPUTE c4_SL = c4*0.443.

COMPUTE p11_SL = p11*0.459.

The overall Participation dimension value is calculated by adding the above values and dividing the result by the sum of the factor loadings of the variables

```
COMPUTE F7partic = (p10_SL + r4_SL + c4_SL + p11_SL) *10/(0.711 + 0.548 + 0.443 + 0.459).
```

SPSS syntax for calculation of the overall QoL Index score

```
*Calculation of the overall QoL Index score, output to be out of 100*

*Each dimension is multiplied by its corresponding weight (eigenvalue). These values are added and then divided by the sum of all the dimensions' weights*

COMPUTE QoLIndex_Data_Driven = 10*(1/15.939)* (3.801*F1servic + 2.695*F2soclas + 2.596*F3govsat + 1.936*F5health + 1.811*F6safety + 1.735*F4lifsat + 1.365*F7partic).
```