

# GCRO'S QUALITY OF LIFE SURVEY: SAMPLING WORKSHOP BRIEFING DOCUMENT

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## Briefing document

This document was prepared as part of the Gauteng City-Region Observatory's Quality of Life survey ten year review process. It is a lightly edited version of the document provided to participants in preparation for the sampling workshop hosted on 14 February 2019.

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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).

Recommended citation: De Kadt, J. and Crowe-Pettersson, K. (2020) GCRO's Quality of Life survey: Sampling workshop briefing document. Johannesburg: Gauteng City-Region Observatory. Available at <https://gcro.ac.za/research/project/detail/quality-life-survey-10-year-review/>.



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## 1 Background

### 1.1 GCRO's Quality of Life Survey

The GCRO's Quality of Life Survey (QoL) was launched in 2009, measuring the self-reported well-being and satisfaction of adult residents of the Gauteng City-Region (GCR), and has been repeated every two years since. The first iteration of the survey (2009) collected data from 6 639 randomly selected adult respondents, distributed across the entire GCR, including areas falling outside of the Gauteng province. The sample was representative at the municipal level. The second iteration of the survey moved towards a ward-representative sample, restricted to Gauteng province only. This required a substantial increase in sample size to 16 729 respondents. Subsequent surveys remained limited to Gauteng, and continued to pursue a ward-representative sample for all wards in Gauteng. All had sample sizes over 24 000, with a peak of 30 002 in 2015/16.

QoL is now recognised for providing high quality data at extremely low levels of geography. It represents an invaluable resource for provincial and local government in the province, as well as for numerous academic and non-profit research projects. Given the scale of the survey, the broad spatial distribution of completed surveys, and GCRO's commitment to ensuring exceptionally high quality data, implementation of the survey has become increasingly challenging over recent iterations. This is exacerbated by the relatively limited resources (financial and human) available for survey implementation. Given available resources, implementation of the survey as currently conceptualised has become unsustainable. In light of the value of the project, a careful review of all survey parameters is critical to finding the strongest path to return it to sustainability. This is a core part of the motivation for the GCRO's internally-driven ten year review of the survey.

### 1.2 Technical review workshops

As part of the ten-year review, the GCRO is implementing a series of three technical review workshops, focussed on reviewing key aspects of the survey. These are (1) sampling; (2) survey management; and (3) questionnaire content. Prof Mark Orkin has been appointed as the external technical chair of the workshop process, to provide guidance to the process, and to assist the GCRO by synthesising recommendations informed by the three workshops. Each workshop is being externally facilitated, by Dr Tara Polzer-Ngwato, and will be attended by a small group of 3-4 external experts, as well as core GCRO team members.

The objective of the series of workshops is to support the GCRO in revisiting sample size and distribution, field processes, questionnaire composition, duration of data collection, indexing, and requisite resources in such a way as to facilitate survey sustainability over the next ten year, while also protecting as far as possible the continuity and value of the survey. Participants in each workshop will work towards generating of a series of considerations for the GCRO.

### 1.3 Purpose of this document

This document aims to prepare sampling workshop participants for the sampling technical review workshop. It:

- Provides a problem statement, and highlights key issues that the GCRO is grappling with;

- Provides an overview of GCRO's approach to sampling for the QoL survey over the years, highlighting areas in which particular challenges have been identified. These include sample size and distribution, selection of respondents in field, and quality control of the sampling process;
- Discusses in more detail potential approaches to resolving issues which have been challenging, drawing in part on the strategies adopted by other broadly similar surveys; and
- Poses key discussion questions for the workshop.

A few additional documents are included as appendices:

- Appendix 1: Background to QoL 2017/18 sampling, providing by Prof Fatti
- Appendix 2: Background to QoL 2015/16 sampling, provided by Dr Neethling
- Appendix 3: Report of South African National HIV Prevalence, Incidence and Behaviour Survey, 2012, with particular reference to Chapter 2. Available at <http://www.hsrc.ac.za/en/research-outputs/view/6871>.
- Appendix 4: Reflections on spatial considerations with regard to QoL sampling and analysis by Gillian Maree and Bonolo Mohlautsi.

Appendices can be accessed through the Quality of Life survey 10 year review website at <https://gcro.ac.za/research/project/detail/quality-life-survey-10-year-review/>.

## **2 QoL Sampling: Problem statement**

Multiple QoL service providers have reported that conducting QoL is harder than other surveys that they have undertaken, and that they underestimated the difficulty of the task. As a result, there have been instances of deviation from agreed-on sampling protocols, and serious delays at least in part due to the difficulties of adherence to sampling protocols. Drawing on GCRO's experience over the years, combined with feedback from multiple service providers, it is clear that various aspects of QoL sampling have contributed to the difficulties experienced in the implementation of the survey.

### ***2.1 Key concerns***

Key sample related concerns which have been identified are as follows:

#### *2.1.1 Overall sample size*

A sample size of over 24 000 surveys conducted at distinct households appears to be extremely challenging for service providers to deliver on, particularly within a relatively constrained time-frame. Approaches which work well for smaller sample sizes do not appear to scale easily to a sample of this size.

### *2.1.2 Geographical dispersion of the sample*

GCRO requires that all QoL surveys are completed in person with an adult respondent, at the respondent's home, and that all wards in Gauteng province are covered. This requires that data collectors physically visit all parts of the province. This adds substantially to the logistical complexity and cost of data collection. The geographical dispersion of our sample has also constrained relationship-building with the communities from which participants are drawn, meaning access must be negotiated anew for each survey iteration.

### *2.1.3 Random selection of respondents in field*

Adult respondents are randomly selected in-field, following listing of adult residents of an identified household or dwelling unit. Fieldworkers must interview the selected adult. Three re-visits are required to deem a particular interview as not possible. This process increases the number of necessary household visits far above the required sample size, and in practice, revisits are not always appropriately implemented. This listing process also provides some incentives to fieldworkers to list only adults found at a particular dwelling during the first visit, which necessitates close quality control.

### *2.1.4 Cross-sectional nature of the sample*

As we recruit new participants for each survey iteration, it is not possible to build long-standing relationships with survey participants or households. Recruitment begins afresh with each iteration of the survey.

### *2.1.5 Stringent quality control of in-field sampling processes*

GCRO has repeatedly uncovered serious deviations from agreed sampling processes, and has consequently come to devote substantial effort to ensuring sampling is conducted appropriately. As data collection has become increasingly electronic, the enhanced transparency has allowed even greater oversight and stringency regarding the appropriate implementation of sampling. Stringent enforcement of an extremely challenging sampling process has contributed to high levels of fieldworker attrition, increased costs, and slower data collection.

### *2.1.6 Substitution*

GCRO has historically allowed in-field substitution of interviews which are deemed 'impossible'. We are concerned that the ease of substitution may encourage inadequate follow-up of sampled dwellings and individuals. However, this does also serve to reduce somewhat the difficulty of fieldwork, and has therefore been important from a practical perspective.

## **2.2 Additional considerations**

Related to the above, but not direct features of sampling, are two major, cross-cutting themes impacting on survey implementation as a whole. These provide constraints on the implementation of QoL, and need to be considered together with elements of sampling listed above:

### 2.2.1 Resources available for the survey

The GCRO funds QoL from its core grant, with additional contributions received from the Metros. Due to resource constraints, budget allocations for QoL have been relatively low given the scale of the project. Due to GCRO’s small size and limited budget, dedicated staffing within the GCRO is also a constraint.

### 2.2.2 External implementation of data collection

Given the GCRO’s small size, and inclinations of staff members, data collection has historically been outsourced, through a tender process, to the private sector. Use of a different service provider for each iteration of the survey has limited the transfer of learning from one survey to the next. GCRO has become increasingly involved in planning and quality control over time. While the management and implementation of QoL data collection is also the focus of a technical review workshop, the location of various responsibilities is an important consideration in thinking through the most effective structure for sampling and respondent selection processes.

## 3 Historical practice

While details of the design and implementation of GCRO QoL sampling have varied over the years, all surveys have shared some common features. QoL is an individual level survey, completed by a fieldworker in a face-to-face interaction with a randomly selected adult respondent (typically 18 and older, though at times allowances have been made for younger respondents heading a child-headed household), at the respondent’s home. Respondents in each survey were randomly selected through multi-stage stratified random sampling. In all iterations, respondents were identified firstly through a process of selection of stands at the ward level, followed by the random selection of a specific dwelling unit or household where applicable, and then the random selection of a resident adult. Table 1, below, provides an overview of the five iterations of the QoL completed to date. This is followed by a more detailed description of each of these surveys, drawn from official reports, internal documentation, and conversation with individuals involved in surveys.

Table 3.1: Overview of GCRO QoL surveys conducted to date

No.	Year(s); months in field	Service provider	Data collection mode	Sample size	Key sampling & respondent selection parameters
I	2009 (2 mos)	DRA	Paper; Manual capture of coordinates from independent GPS device	6 639	Entire GCR; municipality representative PPS at ward level; floor 160 per municipality Random starting point for every 5 interviews in a given ward; interviews at every 20 <sup>th</sup> household Respondent selected by Kish grid Oversampling of visiting points with minimal substitution
II	2011 (5 mos)	Data World	Digital pen with integrated GPS, supported by cell-phone based GPS	16 729	Gauteng only; ward representative Ward level PPS: floor of 16, cap of 60 Variegated grid based on urban/rural land cover used to randomly select starting points for every

					4 interviews in a given ward; interviews at every 5 <sup>th</sup> stand Dwelling unit & household selected by dice roll; respondent by nearest birthday Substitution of stands and respondents
<b>III</b>	2013/14 (7 mos)	GeoSpace	Tablet with integrated GPS	26 387	Gauteng only; ward representative PPS with floor of 60 per metro; 30 otherwise Attempts made to visit each SAL within each ward, with the SAL centroid used as a starting point, with interviews at every 4 <sup>th</sup> stand. Typically 1-2 interviews per SAL, determined on a PPS basis. Dwelling unit & household selected by dice roll; respondent by nearest birthday Substitution of stands but not respondents
<b>IV</b>	2015/16 (10 mos)	Ask Afrika	Tablet with integrated GPS & standalone GPS device	30 002	Gauteng only; ward representative PPS with floor of 60 per metro; 30 otherwise. EA used as PSU within wards. Pre-selection of 5 visiting points per EA. Dwelling unit, household & respondent selected by automated Kish grids Substitution of stands but not respondents
<b>V</b>	2017/18 (10 mos)	ResearchGo	Tablet with integrated GPS	24 889	Gauteng only; ward representative Fixed sample per ward: 50 per funding metro; 30 elsewhere Preselection of visiting points per ward (no clustering). Dwelling unit & respondent randomly selected by data collection device. Substitution of stands but not respondents.

### 3.1 *Quality of Life I - 2009*

GCRO's first QoL (2009) was designed to cover 602 wards across four provinces: Gauteng (448 wards), Mpumalanga (72 wards), North West (70 wards), and the Free State (12 wards). However, due to field errors, interviews were finally only conducted in 572 wards. A total of 6639 surveys were completed. Data collection was conducted by Development Research Agency (DRA). Data collection was completed using pen and paper, with GPS coordinates recorded on a standalone device, and manually transcribed.

Wards were used as the primary sampling unit (PSU). Ward sample sizes were calculated based on ward level populations on a PPS basis, with no ward-level floor or ceiling. A floor of 160 surveys per municipality was applied. For every 5 surveys planned in a given ward, a random starting point was selected. The starting point was the site for the first interview. Subsequent sites were identified by counting 20 'households' to the left on an iterative basis (DRA 2009). The service provider's documentation does not distinguish between stands, dwelling units and households, nor how 'household' selection at each successive site was managed.

Oversampling was used to minimise the need for substitution of households: if 10 surveys were required, 15-20 interview sites would be selected. Substitution of a selected household for a

neighbouring one was only done if all interview sites had been exhausted and the target had not yet been met. Figure 1, below, provides a hypothetical example of sample distribution at the ward level. Randomly selected starting points, at which an interview was conducted, are illustrated by a small circle, and subsequent interviews attached to each starting point are indicated by crosses.

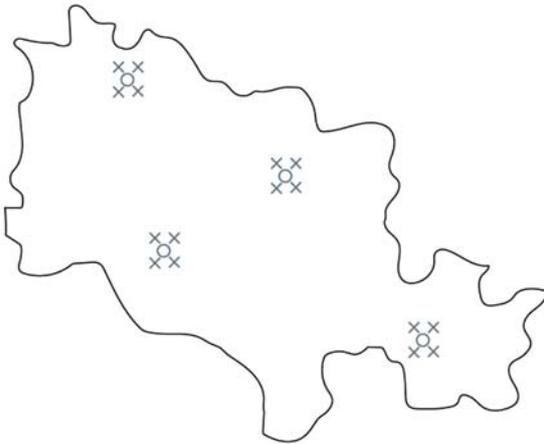


Figure 3.1: Hypothetical ward level sample distribution for QoL I

Adult residents (over 18) at sampled households were listed, and the respondent was selected using a Kish grid. For child-headed households, the head of household was interviewed if at least 15 years of age. Substitutions could not be made following the selection of the respondent. All interviews were completed face-to-face, at the respondent's home, using paper forms (DRA 2009). Information on quality control of the sampling and respondent selection process is limited, but appeared to involve a combination of in-field supervision, and telephonic and in-person back-checking.

Key challenges experienced during implementation related to limited community preparation, and included difficulties in accessing affluent areas with high walls, high levels of household refusals in affluent areas and plots, clashes over access with community policing forums despite clearance from local police, delays from tribal authorities, and delays from apartment block landlords. Management and implementation of appropriate sampling and respondent selection in field was also a challenge, and resulted in oversampling in certain wards, while no interviews were conducted in others. Determining the correct location for surveys was also a challenge. Over 600 instances of fieldworkers recording survey wards incorrectly were identified, and in a similar number of instances fieldworkers had inadvertently completed a survey in a neighbouring ward. Survey coordinates were also incorrectly transcribed from the GPS device in almost 250 cases. Survey length was also identified as a challenge, with the shortest survey duration recorded as 45 minutes. DRA recommended that survey length should be reduced due to respondent fatigue and refusals. Fieldwork lasted roughly 2 months, including all training, and there were no substantial delays.

Weights for respondents outside of Gauteng were calculated at the ward level, based on Census 2001 data recalculated to the 2009 ward boundaries. Within Gauteng, weights were calculated at the municipal level based on Census 2001 municipal populations, recalculated to the 2009 municipal boundaries. The decision to weight based on municipal populations was due to the

number of wards in which no surveys were conducted. Weights did not take racial or gender distributions into account, and the Census 2001 data was not adjusted to better represent 2009 population patterns.

### 3.2 Quality of Life II- 2011

With QoL II (2011), the geographic scope of the survey was reduced to only Gauteng. All of Gauteng's 508 wards (2011 demarcation) were covered, and sample sizes were calculated at the ward level on a PPS basis, with a floor of 17 surveys per ward (Data World 2012). Sample size increased substantially, to 16 729, facilitated by the introduction of electronic data collection, and enabling the analysis of data at ward level. QoL II was implemented by Data World.

Similarly to QoL I, random starting points were selected for each ward, with on average one starting point for every four surveys. However, the approach to random selection of these starting points differed. A variegated grid was placed over each ward, with the density of the grid at any particular point determined by whether the underlying area was urban or not. The grid was more tightly-knit, with more intersection points, in urban areas. Based on the required sample size for the ward, the appropriate number of starting points was randomly selected from the grid intersections – yielding an appropriately greater number of starting points in urban areas. Figure 2, below, illustrates a variegated grid applied to a hypothetical ward. Circles indicate the randomly selected grid intersections which served as starting points at which the first interview was conducted. The crosses indicate other interviews conducted around a starting point. A 30m inward buffer around ward boundaries was used in selecting starting points, to minimise the chances of fieldworkers accidentally moving into adjacent wards. As starting points were linked to grid intersections, their locations were not always appropriate sample points. Such points were manually adjusted by a GIS analyst to ensure they fell in front of a dwelling (Data World 2012). A 33% oversampling was applied to minimise substitutions.

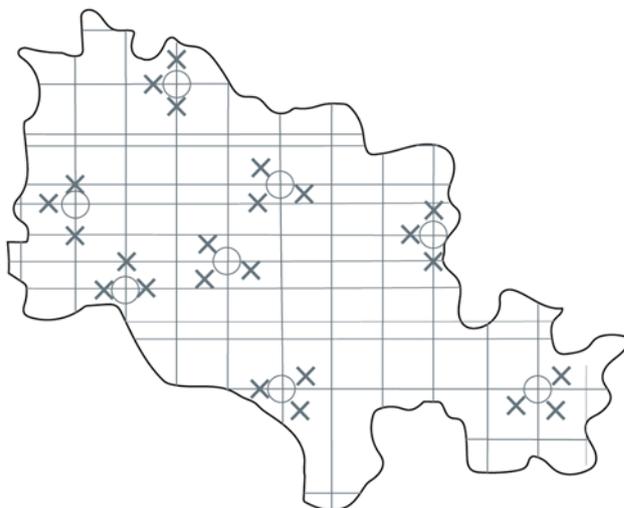


Figure 3.2: Hypothetical ward level sample distribution for QoL II, illustrating the variegated grid approach

Fieldworkers treated the starting point as their first stand. Subsequent stands were selected by counting five stands in the direction of an arrow provided to the fieldworker, alternating the side

of the road. Substitution of stands with a neighbouring stand was permitted following 3 unsuccessful visits. Where multiple dwelling units or households were found on a stand, the appropriate unit or household was selected through a dice roll. Again, substitution of a sampled unit or household was permitted following 3 unsuccessful visits.

Following listing of adult household members, the adult (18+) whose birthday followed most closely after the date of fieldwork was selected as the respondent. When the selected respondent could not be interviewed after 3 visits, they were substituted with the adult with the next closest birthday. In child-headed households, the head of household was interviewed (Data World 2012). The youngest respondents were 16 years old.

Data World's quality control of the sampling and respondent selection process involved a combination of in-field supervision and oversight, monitoring of submitted GIS coordinates, and in-person back-checks. In addition, GCRO contracted a separate team to provide additional independent quality control. When this team uncovered issues, Data World was informed of these, and responsible for remedying them.

Interviews were conducted face to face at the respondent's home, using digital pen technology. This meant that as the fieldworker completed the paper questionnaire, data (including GIS coordinates) was automatically recorded, and then sent directly to an office based database. Office staff checked completed hard-copy questionnaires against the electronic database, correcting any inaccuracies.

As with QoL I, implementation issues related primarily to access in more affluent areas. In some areas, despite a 33% oversampling, minimum targets could not be met. Survey length (averaging 40 minutes) was also again reported as problematic. Delays were experienced, with data collection taking approximately four months. Some issues were again experienced with regard to GIS coordinates, with useable coordinates not being received for a number of surveys. Where feasible, survey coordinates were calculated using available information, such as street address and fieldworker whereabouts. Where this was not possible, but the ward could be confirmed, ward centroids were used as the survey coordinates. For 1008 surveys, the ward could not be confirmed.

Weights were calculated at the ward level, using 2011 ward boundaries, based on Lightstone 2010 DemoprokeyX adult ward populations. For the 1008 surveys for which wards could not be confirmed, municipal weights were calculated. Weights were calculated by Ross Jennings on behalf of the GCRO.

### ***3.3 Quality of Life III- 2013/14***

QoL III (2013/14) again covered all 508 wards in Gauteng (2011 ward demarcations), but with a substantial increase in sample size to 26 387. The survey was implemented by GeoSpace International.

Sampling was again PPS at the ward level, but with a higher floor: 60 surveys in metro wards, and 30 in all other wards. Within each ward, an effort was made to conduct at least one interview in each SAL. Interviews were finally conducted in 16 400 of the 17 840 SALs in Gauteng. SALs not covered included those without residential buildings, and those where access was not possible.

Typically, between 1 and 2 surveys were completed per SAL, with an average of 1.6. The number of surveys per SAL was calculated on a PPS basis given SAL population relative to that of the ward, and the total number of surveys allocated to the ward. Using GIS, a centroid was created for each SAL, and treated as the SAL starting point.

Fieldworkers approached the stand closest to the centroid to attempt their first interview in each SAL. If they were not able to conduct an interview there, they walked in a random direction, established by dice role, and approached the 4<sup>th</sup> stand encountered, alternating sides of the street. This was repeated until the appropriate number of interviews for the SAL were conducted. Substitution of stands was permitted if the interview could not be conducted on the same day – no revisits were required, unless a fieldworker was asked to return later during the same day. Figure 3 below illustrates a hypothetical distribution of interviews across a ward. The circles represent the centroid of each SAL in the ward, at which the first interview per SAL was conducted, and the crosses represent additional interviews in a given SAL.

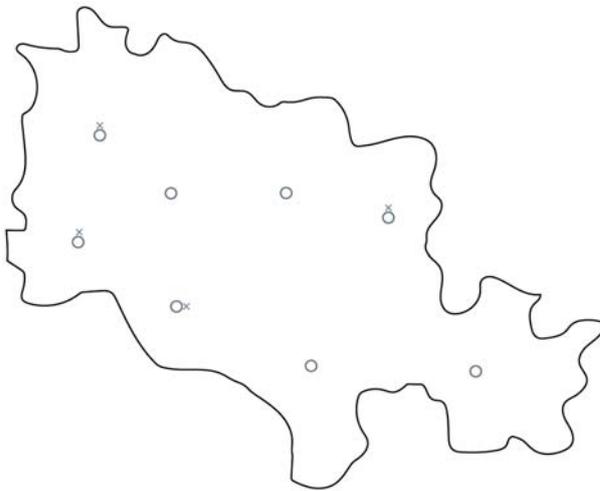


Figure 3.3: Hypothetical ward level sample distribution for QoL III

As in QoL II, when multiple dwelling units or households were encountered on a stand, fieldworkers selected the appropriate unit or household using a dice roll. Documentation does not indicate whether immediate substitution of dwelling units and households was permitted, or whether revisits were first required.

Again, as for QoL II, following household listing, the adult (18+) with the birthday most closely following data collection was selected. In child-headed households, the oldest child was interviewed if they were 14 years of age or older. Substitution of respondents was not permitted, and if an interview could not be completed following 3 attempts, a new stand was selected.

Interviews were again conducted face-to-face at respondents' homes. The surveys were completed by fieldworkers using FormHub on tablets. GIS coordinates were automatically captured by the tablets. GeoSpace's processes for quality control of sampling and respondent-selection included in-field oversight, viewing of survey locations on an online interface, and cross-checking survey locations with coordinates and field maps. Team leaders were also

responsible for taking photos of each SAL visited. An independent company, Gintar Tech, conducted telephonic call-backs with 6 423 randomly selected respondents.

A number of implementation issues were reported. The initial timeline for data collection was 60 days, which was found to be too short for the scale of work required. This resulted in the project going over time, with fieldwork initially taking around 3.5 months. Data management challenges meant that the service provider needed to return to the field for an additional month to conduct additional interviews. In total, data collection therefore required almost 5 months of active fieldwork, spread over a period of 7 months.

Additional challenges reported by the service provider included access, again particularly in affluent areas, as well as complexes and mining hostels. Fieldworkers also encountered widespread abuse while conducting data collection, much of it racial. This contributed to high attrition of fieldworkers – approximately 15%. Some challenges in programming the CAPI device were experienced, leading to a few problems with skip patterns which were only detected part way through data collection.

Individual level weights were calculated using Census 2011 ward-level adult population figures, broken down by race and sex. Iterative re-weighting, also known as raking, was used to align respondent proportions as closely as possible to population figures. Weights were developed by Grant Haywood and Prof Paul Fatti on behalf of the GCRO.

### ***3.4 Quality of Life IV- 2015/16***

QoL IV (2015/16) again covered all 508 wards in Gauteng (2011 demarcations), but increased sample size to 30 002, maintaining representation at the ward level. The survey was implemented by Ask Afrika.

Sampling was again PPS on the basis of ward population, with a floor of 60 in metro wards and 30 in non-metro wards. No formal ceiling was applied, but sample size in some large wards was reduced to compensate for smaller wards in which additional surveys were required to reach the floor target. The approach to sampling differed somewhat from previous iterations of the survey, and full technical detail is provided in Appendix 2. QoL IV sampling relied on an EA-level sampling frame created by Dr Ariane Neethling, in cooperation with GeoTerraImage (GTI) and AfricaScope. This sampling frame was based on Census 2011 data, and incorporated up to date aerial photography, satellite imagery, and dwelling unit counts and coordinates from GTI. It was benchmarked against StatsSA 2014 mid-year population estimates (Ask Afrika 2015). EAs were stratified by ward, and based on each ward's target population size, the appropriate number of EAs were sampled – one EA for every 5 surveys required. Once EAs were selected, 5 visiting points were randomly sampled from the GTI data included in the sampling frame. An additional 5 points were sampled as oversample points where substitution was required. Figure 4, below, illustrates a hypothetical distribution of surveys across a ward. The squares represent the sampled SALs, and the crosses represent the pre-determined points at which interviews were conducted.

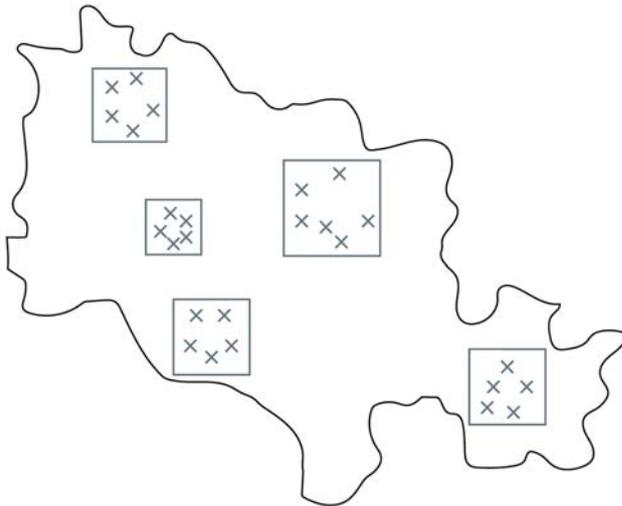


Figure 3.4 **Hypothetical ward level sample distribution for QoL IV.** Squares represent sampled SALs

Fieldworkers were provided with A3 printed colour maps to ensure they were able to locate the sampled visiting points. On arrival at a stand, listing of dwelling units and households was conducted if necessary, and the appropriate unit or household was selected through an automated Kish grid. All adults (18+) in the selected household were listed, and the respondent was also selected through an automated Kish grid. Child-headed households were not interviewed. Some convenience sampling was permitted in complexes and estates where access was extremely problematic, and standard procedures were unable to yield sufficient interviews. Substitution of stands was permitted following 3 unsuccessful visits, or for the following reasons: refusal of entry to the property, vacant stands or houses, language barriers when respondents weren't able to speak a 'common vernacular', no resident of the appropriate age, or no responsible person available to interview. Documentation does not detail the number of substitutions conducted.

Interviews were completed face-to-face at respondents' homes, using the SurveyToGo system on tablets, with integrated collection of GPS coordinates. As a fall-back, GPS coordinates were also collected using a separate TrackLocate device for some surveys. Reconciliation of coordinates from TrackLocate devices with completed interviews was a challenge. Documentation on quality control processes is limited. A large number of interviews were found to have been done in inappropriate locations such as malls or taxi ranks and could not be included in the dataset. The service provider conducted 4 071 in-field call-backs.

Implementation challenges were generally similar to those previously reported, including difficulties with access, and high levels of fieldworker attrition. Fieldworkers were dissatisfied with remuneration and the difficulty of fieldwork, and some theft of data collection devices by fieldworkers was also reported. Due to the difficulty of the fieldwork, initial data collection took substantially longer than anticipated. Use of EAs as a sampling frame introduced some new challenges, as EA boundaries are not consistent with ward boundaries, meaning that some surveys were conducted in the incorrect wards. Accurate recording of GPS coordinates again proved problematic due to challenges with the correct use of the TrackLocate devices, manual capture of coordinates, and problems with GPS settings on devices.

Initial data collection ran for 5 months. Following the identification of problematic interviews which could not be used, the service provider returned to field for a further 3 months. Overall, 8 months of active data collection, spread over a 10 month period, was required to complete all fieldwork.

QoL IV weights were calculated in two stages. Firstly, an individual-level design weight was calculated to compensate for the sample design. This was done using Census 2011 ward-level population figures to calculate the selection probability of each sampled household in the ward, and then by calculating the selection probability of the individual adult respondent given the number of adults in that household. Secondly, design weights were benchmarked to the Census 2011 adult population for each ward, by race and gender, to bring respondent demographics into line with population demographics. Weights were developed jointly by Ask Afrika and Dr Ariane Neethling.

During 2016, municipal and ward demarcations were updated. To improve the utility of the survey data and results for government, it was necessary to conduct some QoL IV analysis using the 2016 ward/municipal boundaries. For this purpose, a second set of weights was calculated, using raking to align the sample to the Census 2011 adult population by race and gender for the new ward boundaries. This process was conducted by GCRO, under the guidance of Prof. Fatti. These weights are only used for analysis tied to 2016 ward boundaries, and for all other analysis the original weights are used.

### ***3.5 Quality of Life V- 2017/18***

QoL V (2017/18) covered all 529 Gauteng wards (2016 demarcations). Although the planned sample size was 38 080, and included some work outside of the province, the final attained sample was 24 889 and limited to Gauteng. Data collection was implemented by ResearchGo.

For QoL V, sampling shifted away from a PPS approach, and a fixed sample size per ward was used. This boosted sample size in wards with smaller populations, increasing precision of ward level results, without inflating overall sample size too substantially – please refer to Appendix 1 for further detail. Sample size was initially set at 50 surveys per non-metro ward, and 65 per metro ward, but finally reduced to 50 per ward for Johannesburg and Ekurhuleni metros, and 35 elsewhere.

As with QoL IV, visiting points were selected from GTI's building based land use (BBLU) data, updated to 2016. This dataset provided the coordinates and number of dwelling units for all residential buildings in the province. For each ward, the appropriate number of visiting points was sampled at random. While previous QoLs had clustered interview points (by starting point, SAL, or EA) for QoL V there was no clustering at all. This substantially increased the difficulty of completing data collection. Once the sample had been drawn by ResearchGo, and verified by GCRO, up to 5 substitution points were randomly drawn from unselected points within 200m of each visiting point. This was intended to facilitate unbiased, live substitution in the field when necessary. Figure 5, below, illustrates the hypothetical distribution of interview points across a ward.



Figure 3.5 **Hypothetical ward level sample distribution for QoL V**

Fieldworkers navigated to visiting points using GoogleMaps. This did not work as well as a physical map, and although an 80m geo-fence was implemented, interviews were often conducted at a neighbouring stand from the one which had been sampled. On arrival at a stand, all dwellings units were listed, and the data collection application randomly selected a particular unit. All resident adults within the unit were then listed, and the application randomly selected the respondent. There was no separate listing of households when multiple households were found in a dwelling unit. Child-headed households were not interviewed. Substitution was closely monitored, and 3 visits were required before a stand could be substituted. Fieldworkers were permitted one opportunity to substitute a dwelling unit within a stand on the first visit if nobody was home, but otherwise 3 revisits were required before substitution of a new stand. Substitution of respondents was not permitted, and 3 visits were required before substitution of a new stand. Due to technical and practical challenges, there was limited use of the pre-selected substitution points, and team leaders typically used standardised protocols to select substitution point in field.

Interviews were completed face-to-face at respondents' homes, using ResearchGo's own application on tablets. GPS coordinates were automatically collected by the data collection application at multiple points throughout the survey. This was an extremely valuable feature of the application, and compared to previous QoLs very few coordinate-related issues were experienced. The ResearchGo application also collected extensive paradata together with survey responses and coordinates, covering the full sampling process as well as the survey itself. This meant that the implementation of sampling protocols could receive very close scrutiny. Surveys in which sampling protocol violations were identified were typically excluded from the dataset. In addition to live examination of incoming data and paradata by both ResearchGo and GCRO, ResearchGo did telephonic call-backs for about 25% of the sample. A small number of in-field call-backs were also conducted.

Data collection ran for a period of 10 months, although with interruptions for the Christmas break and for an additional two month period. Access was again a major challenge, along with harassment and racism directed towards supervisors and fieldworkers by respondents, and

harassment by security personnel. The stringent quality control, particularly around sampling protocols, also contributed to fieldworker demotivation and extremely high attrition.

Individual level weights were calculated based on ward-level Census 2011 adult population figures, broken down by race and sex, updated by the Community Survey 2016 municipality figures. As with QoL III, raking was used to align respondent race and gender proportions as closely as possible to population figures. Due to the relatively flat ward sample used in QoL V, weights were quite variable across wards. Weights were calculated by GCRO, with oversight from Prof Paul Fatti.

### **3.6 Resource considerations**

#### *3.6.1 Data collection budget*

Given the scale and difficulty of QoL, funding levels for the survey are fairly low. In addition to direct implementation costs, GCRO bears additional costs for the survey related to salaries of GCRO staff supporting the survey, administrative and overhead costs, survey launch costs, and any costs related to analysis or dissemination.

The GCRO is funded primarily by an annual core grant from the Gauteng Provincial Government (GPG), supplemented by extensive in-kind support from both Wits and UJ. GCRO funds QoL by earmarking a portion of each annual grant for the project – as the survey has run every two year, GCRO effectively saves for two years to fund a survey. The survey consumes a substantial proportion of GCRO's core grant. Since QoL III, the cities of Ekurhuleni, Johannesburg and Tshwane have contributed additional funding the survey.

GCRO may need to budget at a higher level for future surveys, which may require a smaller sample size, or a reduced frequency of survey implementation. Survey cost is of course not just driven by sample size – sample distribution, the nature of the sampling protocol, the stringency applied to appropriate implementation of sampling, and the general level of quality expected all play an important role.

#### *3.6.2 Additional GCRO costs*

In addition to the funds provided to service providers for data collection and other aspects of survey implementation, GCRO invests substantial additional resources in the survey. Additional costs which are explicitly budgeted for include: technical/statistical support, supplementary quality control support, and costs related to the launch of the data and subsequent dissemination results.

The cost of GCRO staff time does not reflect in the QoL budget, but is significant. Recent iterations of the survey have required substantial time from both senior management and research staff. Furthermore, implementation challenges have escalated demands on staff time rapidly, with negative impacts for other projects and the organisation more broadly, as well as on the well-being of staff and the organisation as a whole.

These costs – and the adequacy of dedicated staffing – are also closely linked to the scale of the project, levels of quality and quality assurance required, and the exact roles GCRO wishes to

assume in the project. The exact roles which GRCO takes on may also have implications for implementation costs experienced by the service provider. While the second Technical Review workshop will focus explicitly on these issues, for the purposes of this review it is important to bear in mind that sample-related decisions have implications for both these more hidden costs, as well as for the amount that the actual data collection costs.

## 4 Overall sample size and distribution

Key drivers behind the current overall sample size and distribution are:

- Ensuring that the dataset can be meaningfully analysed at the ward level; and
- Ensuring that the sample covers all of Gauteng, and potentially additional parts of the GCR which fall outside of the province.

### 4.1 *Meaningful analysis at the ward level*

This places two requirements on sampling: firstly, that the sample drawn is representative of the ward it is drawn from; and secondly, that the sample is large enough to allow for reasonably precise estimates. Appendix 1 provides thoughts on both of these aspects, and how they might be combined with ensuring that the survey remains feasible.

In order to ensure that the sample for each ward is representative of the ward, it is important that sample points are distributed across wards, and not concentrated in a single area. This is particularly important for heterogenous wards – which are often also larger in size (for example, many of the more peripheral wards). Some clustering of surveys within a ward is essential for helping reduce fieldwork burden, but too much clustering will obviously introduce bias and reduce representativeness. The use and size of clustering has varied over the years. Appendix 1 provides some thoughts around appropriate cluster sizes.

Appendix 1 suggests a sample size of 50 surveys per ward provides an optimal balance of precision and cost, given QoL's coverage of the full province. However, the confidence intervals around a sample this size do remain relatively large, and higher sample sizes remain appealing.

Although QoL has used a ward based approach since it started, the question of whether this is the optimal basis for sampling and analysis remains open, and worth discussion.

Wards have been a sensible fit for QoL, given that they are political constructs, and our data is used extensively by government, and for assessments of government performance. Numerous data users, within government and externally, find substantial value in the fact that QoL can be analysed at a relatively small spatial scale because of our ward-based approach.

Using wards has downsides, however – most notably, the decision to use wards immediately ties us to a relatively large sample size – 529 wards with 50 surveys each is already 26 540 surveys. This is a challenging figure to reach with available resources. The utility of sampling at the ward level also varies by area. Where wards are fairly internally homogenous, the strategy makes sense and provides useful data. However, as described in Appendix 4, for highly heterogeneous wards, ward-level aggregations can be extremely misleading. Finally, feedback from recent interviews with government stakeholders suggests that while in theory great value is attributed to the idea

that QoL data can provide ward-level information, use of data at that level is somewhat limited. It seems likely that for a ward level sample to deliver its full value to government, the GCRO would need to invest substantially more resources in facilitating use. In addition to dedicated staff capacity for dissemination, this might include the re-invigoration of GCRO's online ward profile and QoL data viewers.

If the GCRO were to consider moving away from ward level sampling, the obvious question is what might replace it. Any solution would need to preserve to some extent the spatially fine-grained nature of the dataset, and would need to allow analysis at levels of use to government, as well as for academic work. Some stakeholders have suggested that data at the level of clusters of small numbers of relatively similar wards would still be useful for them, particularly to the extent that IDPs are developed at this level in some areas. Another option might be to conduct ward level sampling in municipalities which make more use of the data, and less fine-grained sampling elsewhere – but this has implications for the overall utility of the dataset for a great deal of academic and other work. Other options might also include sampling on the basis of census geography – but this then again raises questions about whether and how government would be able to use this data for planning purposes.

Among the surveys we have reviewed, a few alternative approaches were noted, though none which addresses the GCRO's particularly needs. The World Bank's *Kenya - State of the Cities* report uses municipal-level sampling that is geared towards understanding a city or town's growth dynamics. There is a focus on data and analysis for informal settlements across these cities, and "comparison of households with expenditures above and below the poverty line." (World Bank 2014) Similarly, the New Zealand Quality of Life survey rolled out in seven participating metros of New Zealand focuses on the municipal level. (Colmar Brunton 2016) Most other large surveys reviewed used nationally-representative samples to serve purposes of informing policy makers and global benchmarking, although in many instances the sample is stratified at the provincial or state level. (BPS 2013; CSO 2016; HSRC 2014; Pew Research 2015; SALDRU 2009; SALDRU 2011; SALDRU 2018; Stats SA 2016)

Any shifts to sampling strategy would also raise important questions about comparability between historical and future data. These issues also need to be taken into account.

## **4.2 Covering the GCR**

While QoL I covered areas outside of Gauteng, all subsequent surveys have focused solely on the Gauteng province. Plans for QoL V had initially included a small number of interviews in parts of the GCR falling outside of Gauteng, but this had to be dropped. Given the growth in the peripheries of the province, and the continuity of human settlements across provincial borders, the fact that QoL only covers Gauteng province is something of a limitation.

While our data is widely used to compare municipalities across Gauteng, the extent to which municipalities themselves use the data varies. Despite increasing interest in the raw data from government, use of raw data by government remains a challenge. While there are pockets of extensive use of QoL data in government, these are isolated. The GCRO responds to requests for ward-level data and analysis in so far as possible, but capacity is limited, and GCRO typically does not disseminate much ward level analysis. While GCRO did develop online ward-level and

QoL data viewers, these have not been substantially maintained in recent years. Sample sizes for wards in local municipalities have historically been quite small, which also reduces the utility of ward level analysis in these areas.

This raises questions about whether it makes sense to continue to devote the full resources of QoL to the Gauteng province, or whether to consider reducing the fine-grained nature of coverage in some parts of the province to extend the reach of the survey more broadly. Alternatively, if extending QoL beyond provincial boundaries is important, are there other potential ways to fund this work?

## **5 How we sample and select respondents in the field**

### ***5.1 Overall approach to sampling and respondent selection***

As previously described, the overall approach to sampling and respondent selection has varied somewhat for each iteration of the survey. Beyond issues of sample scale and distribution discussed in Section 4, key points of variation have included whether survey points are pre-selected or selected in the field, and if selected in the field, how this is done. To what extent is it worthwhile developing a more standard protocol moving forwards, and if so, what would this look like?

### ***5.2 Respondent selection***

At the core of QoL's approach to respondent selection across all iterations of the survey has been the practice of fieldworkers knocking on randomly sampled doors to recruit participants. This essentially amounts to cold-calling, and has been consistently recognised as a particularly challenging aspect of data collection. Simply obtaining access to doors in many areas is extremely difficult. Negotiating access to estates and complexes is a lengthy and uncertain process, and not one that a typical fieldworker can manage independently. When access is negotiated, it often proves necessary to agree only to interview volunteers. In more affluent areas, with high walls and gates, accessing residents is challenging, and fieldworkers frequently run into challenges with private security companies. Rural areas and mining hostels are also consistently problematic. Racist attacks on fieldworkers are also widely reported. Conversations with practitioners also indicate that while access in township areas remains easier than in other parts of the province, it is becoming more difficult over time.

Access is perhaps even more challenging for QoL than for other surveys because sample points are so widely distributed. This means that efforts at publicity have generally been fairly unsuccessful, because there is a need to cover the entire province – with very little funding. Furthermore, even though QoL has now been implemented 5 times, the distribution of the sample means there is no real opportunity to build long-term relationships with communities.

All of this contributes to the difficulty of fieldwork, and by extension its cost and duration. There is an important question to be asked about whether QoL should continue to make use of this method – and indeed, whether there are any viable alternatives.

Alternative approaches are not unprecedented: customer service surveys for the City of Johannesburg and the City of Tshwane now draw on telephonic interviews with randomly sampled account holders in more affluent areas, while retaining a household survey component in other areas.

Quality of life surveys in the developed world have largely moved away from in-person interviews. For example, the *New Zealand Quality of Life* survey (2016) sent out hard copy survey invitations to sampled individuals. Participants were given an option to fill in the survey online, or to self-complete a hard copy questionnaire (Colmar Brunton 2016). *America's Changing Religious Landscape* (2015) used random-digit dialling stratified at the state level (Pew Research Centre 2015). Response rates for telephonic and online surveys are low, however. Pew Research Centre reported a response rate of 11.1% for their landline sample and 10.2% for their cell phone sample.

In addition to low response rates, a telephonic or online approach raises clear issues of a sampling frame, and the approach certainly couldn't be applied to the full QoL sample. However, is it a possibility for more affluent areas, and perhaps particularly for complexes, estates and high wall suburbs? To what extent would it provide a more or less random sample than current approaches? And given that mode of interview does impact responses, how problematic would it be to combine surveys collected in different ways into a single dataset?

An alternative possibility to consider might be to begin to develop QoL into a panel study. This would reduce the burden of random sampling over the longer run. However, this would also fundamentally change the nature of the survey, and would impose other costs and challenges in terms of sample retention. Is this a viable strategy to pursue, and if so, how would it best be approached?

### **5.3 Adherence to respondent selection criteria**

The GCRO has consistently held that it is critical that sampling and respondent selection is implemented in line with agreed on protocols, to ensure a sample that is as unbiased as possible. Historically, GCRO has been concerned about the extent of adherence to appropriate sampling and respondent selection practices in the field. However, these processes were managed by service providers, and GCRO had limited insight into the details of implementation. With QoL V, we received far more sampling-related paradata, allowing closer interrogation of field practices. This revealed in-field efforts to implement convenience sampling, at times in collaboration with team leaders. This suggests that some level of convenience sampling is probably fairly common in household surveys, and particularly those conducted in challenging environments with low response rates, such as Gauteng.

We have found limited publicly available documentation of quality control specific to the implementation of respondent selection in the field for other household surveys. Conversations with practitioners suggests that this is taken seriously, and often relies heavily on team leaders and on back checking. For example, the HSRC's HIV prevalence survey makes use of extensive, independent in-field back-checking which covers sampling. This practice, however, is supported by a per-survey budget many times larger than QoL's.

The question then is how stringent GCRO should be with regards to the implementation of sampling protocols. Greater stringency comes at a cost, both financially and in terms of time. One strategy might be to agree on an explicitly more flexible approach to in-field sampling, but to monitor this very tightly. An alternative might be to retain the current approach to sampling, but leave monitoring in the hands of the service provider, accepting that some level of convenience sampling will occur. Another might be to insist on tight monitoring of the current approach to sampling, and to accept some reduction in sample size and a longer data collection period to compensate.

## **6 Managing Gauteng's low response rate**

Gauteng is known to have a particularly low response rate in household surveys. As previously described, all iterations of QoL have allowed for some extent of in-field substitution to manage this and ensure that adequate sample sizes were attained. However, the details around when substitutions are accepted and how they are implemented have varied quite substantially. This is likely not ideal, and a standard protocol for substitutions, which balances methodological rigour with practical considerations, and which can be used consistently in future iterations of QoL, would be valuable.

### *6.1.1 Oversampling*

Oversampling was only used in QoL I and II. Reasons for the decision not to continue with this practice are unclear. However, without full insight into how a particular service provider implements oversampling in the field, and in particular whether all oversample points are visited, it is hard to gauge the benefits of oversampling relative to substitution of stands (or whether it is indeed a distinct approach from the pre-selection of substitution stands).

### *6.1.2 Substitution of stands*

Substitution of stands was accepted in all iterations of QoL, although in QoL I and II oversampling was used to reduce the need to substitute stands at which interviews failed. QoL III appears to have been particularly lenient in terms of allowing substitution of stands after a single visit in which nobody was home, while most other iterations required 3 visits before substitution. Selection of substitute stands has also varied, ranging from complete pre-determination in QoL IV and parts of QoL V, to in-field selection through a particular protocol (QoL II & III), or even to the discretion of the team leader and fieldworker (parts of QoL V).

### *6.1.3 Substitution of dwelling units or households*

Details around substitution of dwelling units or households is limited. In QoL V, fieldworkers had one opportunity to substitute within a stand, without need to make a revisit. Substitution of dwelling units or households was accepted following 3 visits in QoL II, but it is not clear whether this could be within the same stand, or how often it could be done. It is worth noting that the substitution of dwelling units or households within a stand is particularly challenging to manage from a quality control perspective.

#### *6.1.4 Substitution of respondents*

Details around substitution of a sampled respondent are less clear for many iterations of the survey, but at least in QoL II and QoL V, this was strictly discouraged. Where a sampled individual could not be interviewed, substitution of a stand or dwelling unit was required. Greater leniency around stand substitution than respondent substitution makes some sense from the perspective of minimising bias to the sample. If fieldworkers are simply able to replace respondents who are not at home, this substantially reduces the chance of interviewing individuals in full time employment or studies. However, if a stand with no-one at home is substituted, while this does reduce the chance of an interview in households where all members are employed, there is still a reasonable chance that the sampled individual at the replacement stand will be employed or studying.

#### *6.1.5 Management of substitutions*

Excessive stringency around substitutions simply makes the survey too difficult, resulting in fieldworker demotivation and attrition, as well as in cheating – for example conducting inappropriate listings, or interviewing someone other than the sampled respondent. QoL V implemented extremely rigid and tightly controlled sampling processes, contributing to challenges in field including cheating, fieldworker attrition, and slow data collection. Data collection was simply too difficult. In some instances, some leniency was introduced - for example in complexes and flats, and providing team leaders authority to make substitution decisions. Together with enhanced fieldworker support, this facilitated completion of data collection.

In QoL V, due to the greater transparency afforded by the mode of data collection, we were able to see instances in which fieldworkers conducted interviews at inappropriate dwelling units and with incorrect respondents. The extent of these practices, particularly among more experienced fieldworkers, suggests that ‘unofficial’ substitution was likely occurring with some frequency in previous iterations of the survey. This highlights the importance of close quality control of sampling and respondent selection processes, but also of ensuring that these processes are practical and manageable.

Appropriate incentivisation of fieldworkers is also essential – if fieldworkers are remunerated only for completed surveys, they are motivated to take short cuts in sampling to reduce the potential need for revisits. In QoL V, providing fieldworkers with per diems and transport helped to address these challenges.

To the extent that substitution is used, our experiences with QoL V also made clear the importance of a system which permits ‘live’ substitution, while a fieldworker is still in an area. Initially, substitution required a series of back-office checks, which meant substitutions could not be implemented on a ‘live’ basis. This escalated the number of times fieldwork teams would need to return to particular areas, and reduced the likelihood of interviews being completed at each visit. This had serious implications for costs, timelines, and fieldworker motivation. Once team leaders were able to authorise substitutions in field, with back-office support, efficiency improved substantially. However, balancing the need for ‘live’ substitution with ensuring that appropriate substitutions are made is a critical consideration.

Of other surveys reviewed only Kenya - State of the Cities (2014) indicates use of substitution. This was done at the EA level, for EAs no longer including households. Replacement EAs were selected using the sampling plan, but in some instances replacements could not be made (World Bank 2014). Neither the National Income Dynamics Study (2009) or the South African National HIV Prevalence, Incidence and Behaviour Survey (2012) allowed for substitutions at the household level (HSRC 2014; SALDRU 2009).

## 7 Weighting

As discussed in the survey overview section, approaches to weighting QoL data have varied over the years. Initially (QoL I & II), data was simply weighted to ward or municipal level population, with no adjustments on the basis of demographic factors. In QoL III and V, weighting was done on the basis of ward population, broken down by gender and race. This was also the case in QoL IV, but in this instance, an additional step of first calculating a design weight was taken. There are also some variations in the data source used for weighting purposes, as well as whether Census data used was updated to the period of data collection.

These variations raise the question of whether there is value in standardising weighting practices moving forward – and if so, what the optimal strategy would be, given study design.

In addition, these variations also raise questions about whether previous iterations of the survey should be reweighted for consistency. This may be of particular importance for longitudinal analysis. There is, however, the possibility that this may alter previous results. It would be important to consider what types of analysis would need to be re-done, and think through potential implications.

## 8 Key questions

- What is the ideal scale for the QoL survey moving into the future? Considerations include:
  - o Availability of resources (human and financial). Given available resources, what scale of survey can the GCRO realistically undertake, and at what frequency?
  - o How important is it to preserve the ward as the primary level of sampling and analysis? Could an alternative approach provide the same level of value, while reducing fieldwork burden?
  - o How important is it to continue to cover all of Gauteng at the same level of spatial detail? And how important is it to expand QoL to cover the full GCR?
  
- How can GCRO balance ensuring a suitable sample, with manageable sampling and respondent selection practices in the field?
  - o Is there utility to standardising the sampling and respondent selection protocol for QoL surveys moving forwards? If so, what should this look like?
  - o Access is a major challenge – fieldworkers are essentially cold-calling potential respondents. Are there ways to reduce the burden of this? What are the

implications of considering alternative strategies, including telephonic and online interviews?

- GCRO's quality control requirements around sampling and respondent selection have become increasingly stringent over the years. Quality control processes have also evolved over the years. Increasing use of electronic data collection has enhanced the transparency of all aspects of sampling and survey completion. This has both suggested, and permitted, increasingly stringent approaches to quality control. What is an appropriate level of stringency, given resource and time constraints?
  
- What is the most appropriate way to manage low response rates?
  - QoL has typically made use of substitution at the stand level. Is this appropriate, or are there reasons to return to a practice of intentional oversampling?
  - Is there value to developing a standard protocol around substitutions (stand, dwelling unit, household and respondent), if substitution continues to be used – and if not, for the use of oversampling? If a standard protocol is worthwhile, what should this look like, taking resource constraints into account?
  - As with initial selection of respondents, how tightly should the protocol around substitutions be managed?
  
- What is the most appropriate way to manage weighting for QoL in the future?
  - Is there value to developing a standardised approach? If so, what should this look like?
  - Is there value to reweighting previous iterations of the survey for consistency?

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