Citizens' Survey 2016 - Technical appendix

Size of the sample

For the majority of questions in the Citizens' Survey 2016, the sample was 2,006. The sample size varies by question as not all respondents answered each question.

This sample size is consistent with previous Citizens' Surveys.

Sampling design

A sample of the population aged 16 years and over, who are representative of the City's population, are selected and information about their views, behaviours and characteristics is gathered.

The survey aims to survey a similarly representative sample of people each year so that changes can be monitored over time.

The sample design used for the Citizens' Survey 2016 is a cluster-based quota sample. Quotas based on population estimates at ward level ensure the survey is representative of gender, age and ethnicity. This replicates the sampling used in the Citizens' Surveys from 2011 onwards.

Prior to 2011, Citizens' Surveys undertaken in Nottingham also used a cluster-based quota sampling approach. However, there was some variation in exactly how areas, households and individuals have been selected in recent years. In previous years there may have been a sampling bias which is likely to have affected the reliability of the results. This should be taken into account when comparing the results of the survey with data from before 2011.

Sampling methodology

This year's approach involved a multi-stage sampling procedure. This was to ensure that the sample is representative of the population in terms of deprivation, according to the Index of Multiple Deprivation 2015. The Index of Multiple Deprivation (IMD) is measured at the lower level super output area (LSOA) geography

The sampling methodology involved the following stages:

Stage 1: Selection of lower level super output areas

The City's 182 LSOAs were ranked by their IMD 2015 score to ensure that the sample included LSOAs from across the full range of IMD scores found in Nottingham.

Stage 2: Selection of output areas

The City's 182 LSOAs contain 996 output areas (OAs). Within the LSOA list ranked by IMD score (as described previously), the OAs were listed numerically. Once a starting point had been selected within the list of OAs, every fourth OA was selected, providing the 306 OAs that would be included in the survey.

This method resulted in more OAs being selected in some wards than others as some wards are more heterogeneous in terms of LSOA level IMD score. In order to interview approximately 100 participants per ward, it was therefore necessary to interview more people in some OAs than others. The resulting number of interviews per output area ranged from 5 to 18. Details of the sampling scheme can be found in table 1.

Stage 3: Selection of individuals to interview
Fieldworkers were mainly local people recruited temporarily by the survey company, InformationbyDesign, to conduct the survey. The fieldworkers were allocated to conduct interviews in named OAs, with individual sampling points then selected at random within the OA. They selected subsequent households to target by calling at every 4th house.

Fieldworkers were provided with age and gender quotas at ward level based on the demographics from the 2011 census. Fieldworkers aimed to interview a specified number of people from each of these demographic groups within the ward that they were operating.

At a city level, the fieldworkers collectively aimed to achieve a sample which was representative ethnicity and working status taken from the 2011 census.

Further details of the sampling scheme and the number of interviews undertaken in each ward are included in table 1.

Use of confidence intervals to interpret the results
Confidence intervals are used to attach a level of certainty to a set of results when a sample is used to gain an understanding of a population characteristic in a cross sectional study. They provide a range within which we can be confident the true value of a statistic lies for the entire population and are generally written in the form of ± X%. We cannot be 100% confident that the values lie within the range; most commonly the confidence level quoted is 95% (i.e. the true value of the statistic lies within the range 95 times out of 100).

Confidence intervals should, theoretically, only be used when probabilistic (random) sampling is used. In this survey quota sampling, a form of non-probabilistic sampling was used as in previous Citizens' Surveys. In practice, confidence intervals can and are often calculated for surveys which use quota sampling in order to guide those using the results.

If a confidence interval were to be calculated for the entire sample using a formula which assumes a simple random sample, we could be 95% confident that the results from the sample of 2,006 people from a population of 259,703 adults would be accurate to within ±2.18% (which is statistically very robust).[1] This would mean that if 50% of people said 'yes' to a particular question, we could be 95% confident that if we consulted the entire population, between 47.82% and 52.18% of people would say 'yes' to this question.

However, since the Citizens' Survey 2016 uses a cluster-based quota sampling methodology, it is statistically more appropriate to calculate and incorporate a design effect in the formula to calculate the 95% confidence intervals. The design effect is a statistic that takes into account the fact that strata or clusters were used as part of the sampling process. Initial calculation of the design effect statistic for this study, calculated by Information by Design, indicates for this survey that the confidence interval would be approximately ±3.5% points for a statistic of 50%. This would mean that we could be 95% confident that the results from the population would lie in the range 46.5% to 53.5%.

[1] 2.18 is calculated SE(p) = 1.96 √[(1-n/N)p(1-p)/(n-1)] = 1.96 √[(1-2,006/259,703)0.5(1-0.5)/(2,006-1)] = 1.96 x 0.01112 = 0.0218 or 2.18%

As the number of participants taking part in areas within the City, such as Local Areas and wards is less than 2,006, statistically we can be less confident that the results of the survey represent the views of the population in that sub-group.

Sub groups

In the Citizens Survey dashboards 2016, results are quoted by some of the following:

- Local Area
- Gender
- Age group
- Ethnic group
- Disability
- Employment status
- Housing tenure
- Presence of children under 18 in households

For each dashboard, breakdowns shown are those where there is more difference in findings by sub-group.

Results are calculated for sub-groups containing more than 100 people. No attempt should be made to use results for a sub-group of less than 100 people. For this reason, results at Local Area level can be calculated but the sample size is too small for results at ward level to be statistically significant.

Details about the sample and the sub-groups within it can be found in table 2.

Weighting

The results from the Citizens' Survey 2016 have been weighted using the 2015 mid-year population estimates according to age, gender, ethnicity and local area to make the sample more representative of Nottingham's population.

Details of the weightings used can be found in table 3.

Table 1: Sampling scheme for 2016 Citizen Survey

Ward	LSOAs per Ward	OAs per Ward	OAs covered Per Ward	Average No. Interviews Per OA to Achieve Approx. 100 Per Ward	Total Number Interviews
Arboretum	7	40	18	6	100
Aspley	10	50	17	6	96
Basford	10	53	16	6	101
Berridge	11	60	19	6	107
Bestwood	11	62	19	5	96
Bilborough	11	58	17	6	110
Bridge	10	58	18	5	98
Bulwell	11	56	18	6	105
Bulwell Forest	9	48	14	7	99
Clifton North	9	43	10	10	101
Clifton South	9	49	12	9	102
Dales	9	51	13	7	91
Dunkirk & Lenton	5	32	14	7	104
Leen Valley	6	32	11	8	92
Mapperley	9	56	19	6	106
Radford & Park	10	63	17	6	96
Sherwood	10	54	16	6	97
St Ann's	12	63	20	5	96
Wollaton East & Lenton Abbey	4	20	6	18	110
Wollaton West	9	48	12	8	99
Total	182	996	306	7	2006

Table 2: Sample profile (weighted data)

	Number of cases	Percentage of sample
All respondents	2,006	100%
Area 1	182	9.1
Area 2	204	10.2
Area 3	265	13.2
Area 4	351	17.5
Area 5	217	10.8
Area 6	337	16.8
Area 7	168	8.4
Area 8	283	14.1
Male	1008	50.2
Female	998	49.8
16-24	538	27.0
25-34	379	19.0
35-44	294	14.7
45-54	284	14.2
55-64	214	10.7
65-74	155	7.7
75+	133	6.6
Age not known	*11*	-
White British	429	65.0
All ethnic minority groups	1559	35.0
Ethnicity not known	*18*	-
Activities limited by disability	403	21.6
Activities not limited by disability	1595	78.4
Disability status not known	*23*	-
Employed or self-employed	891	44.6
Unemployed and available for work	71	3.6
In full-time education	443	22.2
Wholly retired from work	299	15.0
Otherwise not in paid work	292	14.6
Employment status not known	*10*	-
Property owned	850	43.1
Property rented from Council / HA	451	22.8
Property rented privately	674	34.1
Housing tenure not known	31	-
Household with under 18s	665	33.4
Household with no under 18s	1324	66.6
Under 18s in household not known	*17*	-

Table 3: Weighting profile

	Percentage of sample **(Unweighted)**	Percentage of sample **(Weighted)**
Area 1	10.2	9.1
Area 2	9.8	10.2
Area 3	14.9	13.2
Area 4	15.0	17.5
Area 5	10.2	10.8
Area 6	14.6	16.8
Area 7	10.4	8.4
Area 8	15.0	14.1
Male	45.8	50.2
Female	54.2	49.8
16-24	20.9	27.0
25-34	17.1	19.0
35-44	14.1	14.7
45-54	14.6	14.2
55-64	12.1	10.7
65-74	12.0	7.7
75+	9.1	6.6
White British	68.4	65.0
All ethnic minority groups	31.6	35.0