***Social Survey Division on NP3APP001***

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# Title: Response/Non-response Model and Strategy for Social Data Collection Process from Scatter to Harvest in Household Surveys

Categorisation
Non Response / Response Rates\SVS Papers

**The response model for ONS Social Surveys**

The response model is the central basis for the non-response strategy for Social Surveys. See Annex A. The model is based on the Groves and Couper (1998) model of likelihood of contact adapted to include cooperation/non-cooperation propensities. The model describes how both societal factors eg neighborhood characteristics and individual factors such as income and age both have an impact on a person's accessible at home patterns. Another factor is physical impediments such as gated communities or the responder not willing to answer the door. In conjunction with external factors are internal factors which include calling patterns both in time and number of calls made to each address. Calling patterns are the main drivers for non-contact rates. In contrast, the internal factors of quality of advanced materials in selling the survey, interviewer metrics eg age, sex, morale and experience and interviewer persuasion strategies impact on cooperation propensity once contact has been made. Additional internal factors are survey length and topic. External factors to cooperation also include survey saturation in the collection area. The above factors all interact to generate a certain propensity to respond for each sub-group of a population. The sub-group composition of the sample selected determines the response rates achieved given all the above factors remain constant.

In mathematical terms, response can be viewed as a multi-nominal distribution-see Annex B. Each sub-group of the population eg flat, single person, male, aged 25, UK born, has a propensity to respond given an advanced letter and other pre-contact material, an interviewer's calling pattern, characteristics and persuasion strategies in the specific area under collection. The combination of these sub-group response propensities forms an overall response rates that follows the binomial distribution. It is possible to derive logistic or probit models to establish correlations between the underlying factors and sub-group propensities. The aim of these models is to establish generic or macro strategies for combating non-response or improving response rates eg generic optimal calling times. The response model is also used below for micro strategies to establish where an interview area's response rates have fallen from the rate achieved in 2011 Census year by a degree that is unlikely to be down to chance alone. These areas are then investigated further using quantitative and qualitative methods but not necessarily based on statistically significance.

**The response strategy for ONS Social Surveys**
The response strategy is based on BRAGW (Black, Red, Amber, Green and White) status:

•White 80% response rate or above-no action required (you will never get 100% due to holidays, working abroad, death, moving house which gives 90-95% then 10-20% will always decline to take part eg the IPS ports survey only gets a consistent 80% response rate where contact and cooperation is less of an issue than on household surveys.)
•White-Green 75-80%-start to monitor
•Green 65-75%-start counter generic/macro strategies
•Green-Amber 60-65%-full scale counters and Part time Non-response team for micro strategies
•Amber 55-60%-full time NR team (Field Response Unit) and Internet Mode?
•Amber-Red 50-55%-start to investigate alternative methods eg large incentives (interviewer and responder), ring fenced FIF for different surveys, internet mode, more ethnic interviewers, extend reissue period, raise sample sizes.
•Red 45-50%-apply alternative methods
•Red-Black-35-45%-start to investigate extreme methods eg Sunday collection, compulsory surveys, increased survey advertising (maybe in selected areas only)
•Black under 35% apply extreme methods

The above limits should apply above and below the Survey Response Rate in 2011 Census year. Overall quarterly targets are calculated but evenly weighted by IA and then IA targets are set. Monthly unweighted targets are just an indication. The limits apply to the 2011 Census year because the CNRLS either concluded ONS SS surveys were not biased given the response rates in 2011 or non-response weights to correct for the bias could be derived from Census data matching. Each IA has the above generic target but also a specific target of the IA response rate in the 2011 Census year.

**The generic/macro strategy is:**
1. Keep questionnaire length and complexity to a minimum. Regularly review the questionnaire. Despite only some evidence that questionnaire length and complexity effect non-response it would seem logical that there is some correlation.
2. Use non-response weights and impute missing data where possible.
3. Consider the use of small incentives especially during periods of known high non-response rates eg Summer.

4. Use a mixed generic calling pattern to contact responders.
5. Use ART and ACT training of interviewers-develop persuauion hooks.
6. Tailor contact to the responder where possible eg their nationality, socio-economic status etc.
7. Use paradata and/or administrative data if possible to estimate non-response bias, derive logistic models and utilize responsive data collection strategies.
8. Calculate non-response consistently and report regularly.
9. Conduct regular refusal follow up studies to ascertain reasons for non-response and Census Link Studies to establish bias..
10. Give responders a choice of collection modes but mainly internet or face to face at wave 1.
11. Review generic collection materials to optimise response and produce promotional materials eg video, web-pages
12. Maintain interviewer morale by attitude surveys.
13. Liaise with experts in the field of non-response and other organisations conducting surveys.
14. Improve MIS systems to monitor response rates over the collection period.
15. Keep the survey design SMART i.e. as efficient as possible to deliver the accuracy required.

**The micro strategy is:**

1. Run filters to identify specific collection areas where response has fallen when compared to the 2011 Census year.
2. In areas where a fall is significantly large that it is unlikely to be due to randomness, conduct further in-depth analysis following a specified analytical approach-see Annex C.
3. Report on findings and suggest area specific solutions to combat non-response eg variations to the generic calling pattern; additional interviewer training to match 2011 status or area characteristics (hooks), increase in interviewer morale by targeted support and specific promotional activities.
4. If above fails to raise response, test alternative solutions: Sunday calling, the performance of different interviewers, area specific doorstep refusal studies and larger incentives, increased sample sizes.
5. Also analyse area differences between 2011 and the current period eg student, migrant, employment numbers; survey saturation utilising administrative data if applicable and Census linking.
6. Report on whether the findings in 4) above would mitigate falling response or the findings in 5) suggest the only mitigation is a compulsory survey.

**Recommendations**

The continuation of the generic strategy.

SMART design- eg should we reissue cases who have been ineligible, non-contacts or circumstantial refusal over the first 4 waves in wave 5 where there is only a 1-10% success rate? Should the savings generated by not reissuing these cases be used to reinstate a further 7.5% of wave 1 telephone cases to face to face thereby increasing response rates (or an alternative design change elsewhere)?

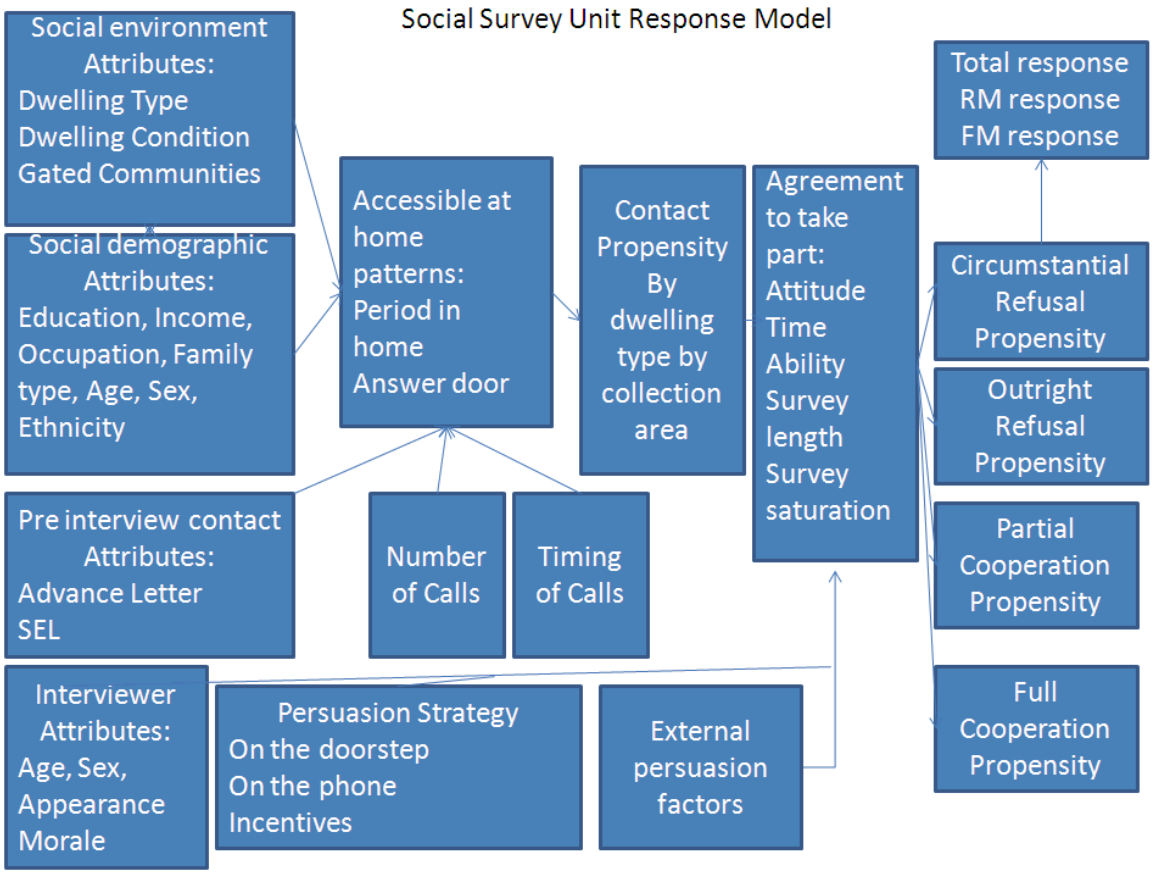
The resourcing of a Field Response Unit to undertake micro-analysis of non-response by Interviewer Area. The production of 1-2 reports per month one for each selected IA analysing the differences between 2011 and the current period. Presentation of findings to a Response Board of senior HQ managers and the Regional/Field Managers of the area under investigation.

The continuation of the work being conducted by Survey Research in Titchfield.

The liaison with external experts to assess their work on non-response in Social Surveys.

The implementation of the NSQR and CNRLS recommendations.

**Annex A**




**Annex B**

Weighted by 1/number of IA's to overall Response Rate

- •Binomial at IA aggregate level
- •Multinominal at dwelling type level.
- •Can be modelled by a probit or logistic hierarchical model
- •Micro analysis is less about modelling more about analsysing changes. Use the binomial model for the filtering only.
- •Once the filters flag a fail then there probably is an underlying cause-change. No need to model this or prove it is significant just need to identify differences and derive strategies to counter the largest ones.

More detailed modelling may help to identify key causes but small sample sizes will make this problematic.

## Multinominal:

pmf $\frac{n!}{x_1! \cdots x_k!} p_1^{x_1} \cdots p_k^{x_k}$

## Grouped to give binomial:

pmf $\binom{n}{k} p^k (1-p)^{n-k}$

## Filter 1

You estimate the difference between two population proportions, $p_1 - p_2$, by taking a sample from each population and using the difference of the two sample proportions,

$\hat{p}_1 - \hat{p}_2$,

plus or minus a margin of error. The result is called a *confidence interval for the difference of two population proportions*, $p_1 - p_2$.

The formula for a confidence interval (CI) for the difference between two population proportions is

$(\hat{p}_1 - \hat{p}_2) \pm z^* \sqrt{\frac{\hat{p}_1(1-\hat{p}_1)}{n_1} + \frac{\hat{p}_2(1-\hat{p}_2)}{n_2}}$, where $\hat{p}_1$

and $n_1$ are the sample proportion and sample size of the first sample, and

$\hat{p}_2$

and $n_2$ are the sample proportion and sample size of the second sample. The value $z^*$ is the appropriate value from the standard normal distribution for your desired confidence level. (Refer to the following table for $z^*$-values.)

$z^*$-values for Various Confidence Levels

| Confidence Level | $z^*$-value |
|---|---|
| 80% | 1.28 |
| 90% | 1.645 (by convention) |
| 95% | 1.96 |
| 98% | 2.33 |
| 99% | 2.58 |

## Filter 2
## Modified Sign Test

Let $p = \Pr(X > Y)$, and then test the null hypothesis $H_0$: $p = 0.50$. In other words, the null hypothesis states that given a random pair of measurements $(x_i, y_i)$, then $x_i$ and $y_i$ are equally likely to be larger than the other.

To test the null hypothesis, independent pairs of sample data are collected from the populations $\{(x_1, y_1), (x_2, y_2), \ldots, (x_n, y_n)\}$. Pairs are omitted for which there is no difference so that there is a possibility of a reduced sample of $m$ pairs.[1]

Then let $W$ be the number of pairs for which $y_i - x_i > 0$. Assuming that $H_0$ is true, then $W$ follows a binomial distribution $W \sim b(m, 0.5)$.

1 tail b(m,0.66)

Three filters:
The first two filters are statistical filters. The first is the difference between proportions between the response in a Interview Area in 2011 with response rates over the last 4 quarters combined (rolling annual). If the differences is greater than approximately 10% then the change is unlikely to be down to chance at a 99% confidence level. The second filter is a sign test that compares the response in an IA in 2011 with each quarterly response rate over time to detect if the response rate drop is greater than approximately 3.33%. If the last 4 quarters all have a drop of greater than 3.33% then there is an underlying change that is unlikely to be down to chance. The final test is just whether the current quarterly response is less than 50%, so it is in Red status. This is used to prioritise the importance of the areas to investigate. Of course an IA may fail the second test 3 times and then the first test and third tests on the 4th time.

•Why 2 filters?
- •To pick up IAs that change by >10% very quickly but also to pick up IA's that change by >3.33% over a few years or sooner.
- •Without picking up too many that haven't changed or only ones that have changed a lot.
- •Comparing to 2011, averages out seasonal effects; census year is where CNRLS gives bias estimation as negligible or allows correction factors etc. Also interview attitudes survey year.
- •Yearly averages for filter 1 and yearly/quarterly for filter 2 provide large enough sample sizes and account for variation in both periods

So there can be no counter arguments eg 2011 was a 'good year'

**Annex C-Order of micro analysis**

Order the difference between 2011 and current from highest to lowest impact. Investigate all changes that when accumulated would cause filter 1 or 2 or both to fail. Then

Investigates change between 2011 and current impact split:
Fact to face
Telephone

(Internet)

Then for each of the above streams investigate the change impact split:
Non-contact-calling patterns-dwelling type
Refusals-reasons-interviewer metrics (age, experience, morale, equivalence)-dwelling type-persuasion strategy-duel scaling Interviewer by reason for refusal
Possibly Refusal reasons and type (outright/circumstantial) by time of contact (cross tabulation) covering responders who then respond at later waves.

Then for each of the above streams investigate the change impact split (if possible):
Demographics-students, migrants, employed
Housing-flats, gated communities, detache
Household type-family type