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Weighting Strategy for Understanding Society

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Non-Technical Summary

When analysing survey data, the analyst must decide what “weight” to give each unit (e.g. person or household) in the sample. A simple solution is to give equal weight to each sample unit, but this is not always appropriate. Certain types of units may be under-represented, in which case they should be given a larger weight, in order to make the (weighted) sample representative of the population.

This paper discusses some of the issues in producing weights for users of the *Understanding Society* data. The issues are more complex than on a standard survey, due to a number of complex features of the design of *Understanding Society*. These features include:

- data are collected both from households and from individual members of the household;
- there are a number of different data collection instruments (household interview, individual interview, self-completion questionnaire, biomarkers), which gives rise to the possibility that some individuals may complete some instruments but not others;
- there are multiple waves, which gives rise to the possibility that some individuals may provide data at some waves but not at others;
- the study is based on a number of different samples, which were selected in different ways.

The strategy that will be used to provide weights to users of the *Understanding Society* data is set out in this paper. The strategy is intended to deal with the complex features mentioned above and may be of interest to potential data users and to survey methodologists, particularly those responsible for implementing weighting on other household panel surveys.

Weighting Strategy for Understanding Society

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Abstract

This paper outlines the strategy for the development and provision of analysis weights for *Understanding Society*. The strategy is placed within the context of a number of practical and statistical issues that arise when a survey has such a complex design involving multiple waves, samples, instruments and analysis bases. A fundamental issue considered is for which data subsets weights should be produced, where a subset may be defined by a combination of waves, instruments and samples. Secondary issues concern the auxiliary data for non-response adjustment and post-stratification, the modelling methods, and the subsequent weight calculation methods. There are also important considerations relating to documentation, access and user support.

Key words: combined weights, design weights, non-response, non-response adjustment, post-stratification, sample design, selection probabilities

JEL classifications: C81, C83

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Weighting Strategy for Understanding Society

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1. Introduction

For any survey, the use of weighting adjustments for non-response is a “one size fits all” approach that is parsimonious and can be useful, but is sub-optimal in at least two respects. For any particular survey estimate, the optimal adjustment would:

- a) use covariates (e.g. weighting classes) that are most strongly associated with the parameter to be estimated (“y-variable”);
- b) be based upon the set of sample units that provided data useable for this specific estimate.

Instead, a single weighting adjustment will typically:

- a) use a set of covariates that may be weakly associated with many parameters of interest, but not strongly associated with any of them; and
- b) be based upon the set of sample units defined in some way as “unit respondents”, even though a subset of these will not be used in estimation (either by choice (subgroup estimation) or because data is unavailable due to item non-response); even for full-sample analysis, potentially a different subset will be unusable for each different survey estimate.

With respect to the second of these limitations, the definition of unit respondents is clearly crucial. If the definition is too broad, then many units with weights will in fact be excluded from the analysis. The weighting is then clearly suboptimal. But if the definition is too narrow, then cases that could have been used in estimation will be excluded as they do not have weights. There is a trade-off to be made.

In the case of a complex household panel survey, the difference between the broadest and narrowest definitions of unit response can be vast, due to the many components of non-response (waves, instruments, items, etc). It is therefore unlikely that there will ever be a single definition that will be adequate for most analysis purposes. Instead, it is common practice to identify multiple definitions of unit respondents and to produce a set of weights corresponding to each definition. However, the potential number of sets of weights can be

daunting, so decisions must be made to restrict production to a manageable subset. Discussion of this issue is the topic of section 2 of this paper. We discuss the problem of choosing which sets of weights to provide for users, we propose some possible criteria for making that choice, and we raise some related issues around documentation, usability and weight production. Section 3 then presents the agreed weighting strategy for *Understanding Society*. The strategy addresses not only the production of non-response adjustment weights but also design weights and post-stratification. It should be noted that this strategy involves producing weights for selected incomplete combinations of waves (in addition to all complete combinations). Some broad criteria for selecting these combinations are suggested but the discussion of section 2 of this paper will be relevant to the detailed implementation of the strategy.

The appendix presents the plan for the production of weights for the first two *Understanding Society* data sets that will be released, namely the wave 1 year 1 General Population Sample “early release” data and the Innovation Panel waves 1 and 2.

2. Which Weights to Produce?

The complexities of longitudinal surveys raise many issues in the development of weights for inclusion on public use data files. Aside from the usual issues regarding selection of a weighting method, there are more fundamental issues concerning the sets of units for which weights should be produced.

The set of sample units available for any particular analysis depends on unit (wave) non-response patterns as well as item non-response patterns. Over multiple waves, the set of responding units can differ markedly between different combinations of waves, both numerically and in terms of composition. For example, using data from a 10-wave survey, analyst A may want to construct an estimate that requires data collected at each wave. Thus, the estimation sample will consist solely of sample members who responded in all ten waves. But analyst B may want to construct an estimate that only requires data collected at waves 1 and 10. Analyst B’s estimation sample will consist of all sample members who responded in waves 1 and 10, regardless of whether they also responded at all or any of the intervening waves. It is likely that analyst B’s estimation sample will be considerably larger than analyst A’s. A single weighting adjustment based upon sample members who responded at each of the 10 waves (i.e. using “response at all waves” as

the longitudinal analogue to the cross-sectional concept of “unit respondent”) would result in many cases in analyst B’s estimation sample receiving a weight of zero. This is clearly sub-optimal for analyst B, both because information is lost due to unnecessarily dropped cases and because the weights do not reflect the specific nature of nonresponse process. To overcome this limitation, a set of weights would be required for respondents to each combination of waves (waves 1 and 10 is the combination relevant to analyst B; waves 1, 2, 3, ... and 10 is the combination relevant to analyst A).

For a longitudinal survey with n waves, there are $2^n - 1$ possible combinations of waves for which analysis would be possible. Each combination represents a potentially different subset of respondents providing data. Furthermore, there are typically multiple survey instruments used at each wave (e.g. main questionnaire, supplementary self-administered instrument, request to link data to official records, biomarkers), with different non-response patterns for each. If there are m instruments administered at each of n waves, this leads to $(2^m - 1)(2^n - 1)$ potential combinations of waves and instruments and hence the same number of potential sets of weights. For example, with 10 waves and 4 instruments, this leads to 15,345 sets of weights!

For surveys with more than two waves, it becomes impractical to provide users with a weighting variable for each possible combination of waves, let alone combinations of instruments additionally.

2.1 Criteria for Choosing Wave Combinations

Decisions regarding the set of combinations of waves for which weights are to be produced could be guided by a number of considerations. We put forward the following as an initial list of considerations that may be relevant. A second step would be to identify the best way of combining these considerations into a single decision rule.

- **Survey design.** Any wave-combinations that are not present in the data by design can immediately be ruled out. For example, if a survey has a rule not to attempt data collection from any unit that has been non-respondent in three consecutive waves, then all combinations involving a respondent wave following three or more non-respondent waves can be dropped.
- **Analytic use.** Some combinations are more likely than others to be required by analysts. For example, if a particular module of questions is included in the survey only at waves 1, 4, 7 and 10, then some researchers interested in the topic addressed by that module may wish to carry out analysis that only draws upon data

from those four waves. On the other hand, there may be no modules other than core demographics that are common to waves 4, 5, 8 and 9, making it less likely that this particular combination of four waves would be of analytic interest.

- **Levels of non-response.** If the samples responding to two wave-combinations differ only by one or two cases, it is unlikely that using weights defined for one combination will make much difference to analysis for the other combination. In other words, the sub-optimality will be trivial. If combinations with minimal differences in respondent sets could be identified then just a single combination from each such set needs to be included in the set of combinations for which weights are to be produced.
- **Correlates of non-response.** The covariates predictive of non-response may differ notably between certain waves or wave combinations. For example, there is some existing evidence that correlates of attrition on some longitudinal surveys at wave 2 and at wave 3 are quite distinctive, but thereafter are similar across subsequent waves. Thus, amongst the set of cases responding to waves 1 and 2, weights derived for response to waves 1, 2 and 3 might be quite different from weights derived specifically for response to waves 1 and 2, whereas amongst the set of cases responding to waves 7 and 8, weights derived for response to waves 7, 8 and 9 might be quite similar to weights derived specifically for response to waves 7 and 8, suggesting that it is not necessary to produce the weights specific to waves 7 and 8.
- **Impact on estimates.** One way of judging the impact of the above considerations – or any others – would be to compare some exemplar estimates between alternative weighting approaches. A set of weights (wave-combination) for which no estimates are “different” from those produced with a different, notionally less optimal, set of weights, could be dropped. Such an empirical approach may, however, be considered inappropriate or at least inconsistent with a principle of producing weights in a way that is independent of *y*-variables.

2.2 Usability and Documentation

If a large number of different weights is produced, it is important to provide users with the means to easily identify the weight most appropriate for their own analysis. Possible approaches to this include:

- Stand-alone documentation that describes the sets of weights and lists the wave-combinations for which each set should be used.

- A decision tree which leads the user to the optimum set of weights based on decisions about which waves are of interest (similar in form to Andrews et al, 1998).
- A computerised version of the decision tree, whereby users input their wave-combination of interest and receive as output an indication of the appropriate set of weights. (In more complex longitudinal surveys such as household panel surveys, the inputs could include also indicators of required survey instruments and sub-samples.)
- A computer programme which does not merely tell the user which weight to use but actually produces a data file containing the required set of cases and the appropriate weight (or alternatively, provides the user with syntax that will perform the same function).
- Seminars and user group meetings.
- A user support facility to help individual users identify the best weights for their purpose and possibly also to create data sets for them.

2.3 Alternative Approaches

Rather than have sets of weights produced centrally and then selected by users as described in the previous section, an alternative approach would be a system that produces weights on demand, following user specifications. In other words, it may be possible to programme an algorithm that draws upon parameters input by the user (to identify waves, instruments, sub-samples, and possibly even specific items).

3. Weighting Strategy

3.1 Introduction

Set out below is the agreed strategy for providing users with analysis weights. A draft version of the strategy was discussed at the *Understanding Society* Methodology Advisory Committee meeting on 10-2-2010 and at the Institute for Social and Economic Research (ISER) Methods Research Group meeting on 26-2-2010. This was then revised in the light of comments and suggestions and was adopted by the *Understanding Society* Executive Team on 3-3-2010.

Motivation

Weights aim to reduce bias caused by under-coverage, sampling or non-response. There is a strong user demand for weights. Much of the information required for weight calculation is not available to users.

Approach

Two broad approaches to the provision of weights can be distinguished. One is for sets of weights to be developed and provided as variables on public use data files. The other is for user-driven software to be developed and provided, that would allow users to produce weights tailored to their own analysis. We believe that the latter has considerable potential advantages but that the required time and resources are prohibitive. We will therefore adopt the former approach.

Samples

The *Understanding Society* sample consists of a number of components (Lynn, 2009). In the remainder of this document, we refer to these as follows:

The UKHLS General Population Sample (*UKHLS-GPS*): new sample of around 25,500 responding households at wave 1. This is based on an equal-probability sample of addresses across the UK.

The Ethnic Minority Boost Sample (*EMBS*): around 3,500 responding households at wave 1. This is restricted to areas with relatively high proportions of ethnic minority persons¹. Within those areas, sampling fractions vary depending on the ethnic mix of the postal sector, with the objective of achieving similar number of interviews in each of five ethnic groups (Berthoud et al, 2009).

General Population Comparison Sample (*GPCS*). A random subsample of the UKHLS-GPS (consisting of one address in half the PSUs) who are asked the additional ethnic minority questions in order to provide a comparison for ethnic minorities. This subsample is not referred to further in this document as we believe there are no specific issues: weights will take the same form as for the rest of the UKHLS-GPS.

The British Household Panel Survey sample (*ex-BHPS*): The sample of persons participating in the BHPS, which ran from 1991/92 to 2008/09. These are likely to

¹ The set of areas included in the EMBS cover over 80% of the ethnic minority population, but only 30% of the total population.

correspond to around 8,500 responding households at wave 2 of *Understanding Society*. The ex-BHPS sample includes boost samples in Wales and Scotland, introduced in 1999, and a Northern Ireland sample introduced in 2000.

Design Weights

Design weights are needed in order to deal with differences in selection probabilities. The sources of these differences in the *Understanding Society* sample are:

- EMBS only: A range of selection probabilities, depending on the estimated ethnic group profile of the postcode sector and the ethnic group(s) of the household identified at the screening stage;
- Ex-BHPS only: Different sampling fractions for the four countries of the UK;
- GPS only: Northern Ireland is over-sampled relative to the other three countries;
- All parts of the sample: Households at addresses with more than three dwellings or at dwellings with more than three households were sub-sampled;
- Ex-BHPS only: New-born children become sample members if either or both parents are a sample member, resulting in a higher (double) selection probability for children whose parents lived in two separate households at the time of wave 1 sample selection.

Non-response Adjustment

Design weights should be adjusted to reflect different propensities of selected households to participate. These non-response adjustments should reflect:

- Differences between households of different kinds in the propensity to participate at wave 1, and conditionally at subsequent waves;
- Differences between individuals in the propensity to participate conditional upon their household participating, at wave 1, and conditionally at subsequent waves;
- Each of the above separately for each study population and sample (see below);
- All of the above separately for each main survey instrument (see below).

Post-stratification / Calibration Adjustment

An additional adjustment may be in order if, after applying nonresponse-adjusted design weights, sample distributions are not a good match to known population distributions. Any such post-stratification adjustment could potentially adjust for:

- Residual non-response error, not corrected by the non-response adjustment;

- Sampling error;
- Under-coverage of the sampling frame.

3.2 Study Populations

Understanding Society is designed to represent multiple study populations that differ in how they are defined in time. All study populations share the same definition in terms of place and eligibility (with one exception, described below), essentially residency in a private household in the UK. Time can be thought of as the time of a survey wave (cross-sectional population), or combination of waves (longitudinal population), with the latter being the primary focus of the survey. Thus, after n waves there are $2^n - 1$ possible longitudinal populations that can be represented. We believe that it is neither practical nor advisable to provide weights to represent each of these populations. We propose to provide weights to represent each of the following sets of populations:

- Each complete combination of multiple waves (complete longitudinal populations), viz. 1+2, 1+2+3, 1+2+3+4, etc;
- Selected other important combinations of waves (incomplete longitudinal populations), to be chosen primarily on grounds of substantive interest², but also considering the impact of wave non-response on sample size³.
- Each individual wave (cross-sectional populations), viz. 1, 2, 3, 4, etc;
- Each calendar year, e.g. 2010 would consist of $w_{1y2} + w_{2y1}$ ⁴⁵.

² e.g. if certain question modules are repeated every two waves beginning in wave 1, the combinations 1+3, 1+3+5, 1+3+5+7, etc may be particularly important.

³ The effect of not producing weights for a particular combination of waves is that an analyst interested in that combination will have to use weights for a larger combination, of which the combination of interest is a subset, with the result that some potentially-useable cases will be dropped from the analysis: e.g. using 1+2+3 weights for analysis of 1+3 would result in exclusion of cases that responded at waves 1 and 3, but not 2.

⁴ We were originally open-minded about the desirability of such a weight. Both MAC and MRG suggested it would be highly desirable. Such weights will only be useful for analysis restricted to variables included in each of two consecutive waves (viz. 'core items')

⁵ We will take into account user demand for analysis by calendar quarters – and hence combinations of quarters, such as financial years – by ensuring that the relevant wave or calendar year weight is appropriate for this purpose, rather than by providing separate weights.

The second of these four categories represents an innovation. Such weights have not been provided for BHPS or any other household panel survey to our knowledge.

3.3 Samples

There are some options regarding the combination of samples to represent the study populations of interest. Additionally some sub-populations warrant separate consideration due to the sample design.

BHPS and UKHLS Samples

Each study population could be represented by just the new general population sample (“UKHLS-GPS”) or the BHPS sample, or both. There are arguments for and against combining the two samples; the appropriateness of doing this may depend on the specific analysis being considered. Though the same data are collected for both samples only from wave 2 onwards, MAC advised strongly that there will be a demand for analysis combining the samples. We therefore propose to produce weights for each sample separately and for the combination (from wave 2 onwards)⁶. We note that the BHPS sample does not represent immigrants to the UK since 1991, so such immigrants in the UKHLS-GPS sample would need to be identified and up-weighted to compensate.

UKHLS-GPS and Ethnic Minority Boost Samples

We propose providing weights for three of the following four combinations, the choice between a1 and a2 to be made following empirical evaluation of the efficiency of including the EMBS in total population estimation:

- a1. The *UKHLS-GPS* alone (to represent the total UK population – minimal design weighting);
- a2. The *UKHLS-GPS* and *EMBS* combined (to represent the total UK population. This would involve down-weighting ethnic minority individuals in the *UKHLS-GPS* living in areas covered by the boost sample);

⁶ The wave 1 to 18 BHPS data will be re-released in a format compatible with the UKHLS data release format, including UKHLS identifier variables to enable merging. Thus analysts will be able to use data for this sample from 19 or more waves, using the new UKHLS weights.

- b. The *EMBS* plus ethnic minority individuals in the *UKHLS-GPS* in areas of low ethnic minority density, i.e. the areas excluded from the boost sample (to represent the total UK ethnic minority population);
- c. Each of the five main ethnic groups separately⁷.

Countries of the UK

It would be possible to combine the relevant GPSs for each constituent country (2 each for England and Northern Ireland; 3 each for Wales and Scotland). The issues are analogous to those mentioned above for combining the BHPS and UKHLS Samples. A combined BHPS/UKHLS-GPS weight could be used for analysis of each country, but the same scaling issue arises as above for ethnic groups.

3.4 Instruments

Understanding Society involves a number of different questionnaires (instruments). As analysis will tend to involve data from one or more instruments (but rarely, if ever, all instruments), and non-response is likely to differ significantly between instruments, we propose to provide separate weights for each main instrument⁸ (for each population and sample combination described above), viz:

- All individuals enumerated (i.e. recorded on the household grid);
- All individuals completing the individual interview in person⁹;
- All individuals completing the individual interview either in person or by telephone;
- All individuals completing the individual interview either in person or by proxy;

⁷ This should not strictly be necessary as the weight to represent the total UK ethnic minority population will suffice for any subset of that population. However, it may be advisable to provide a rescaled weight for each minority group, owing to the expected wide disparity between groups in mean weight

⁸ Where the subsets of individuals responding to each instrument are hierarchical, this provides optimal weighting for all analysis. For example, all respondents to the self-completion questionnaire will also be respondents to the individual interview. For some combinations of instruments response may not be hierarchical – e.g. self-completion and nurse visit – meaning that analysis using data from both must use a sub-optimal weight; for selected important combinations, we may consider providing an additional weight.

⁹ The motivation for providing this weight and the three subsequent ones is that the instrument content (survey questions) for each of the proxy and telephone interviews is a limited subset of that in the full individual interview – and differs between telephone and proxy.

- All individuals completing the individual interview in person, by telephone or by proxy;
- All individuals completing the self-completion questionnaire (for waves/combinations where this applies);
- All individuals completing the youth questionnaire;
- All individuals receiving a nurse visit/ providing biomeasures (where this applies);
- All individuals providing blood (for waves/combinations where this applies);

3.5 Methods / Calculation

We first discuss weighting to represent the wave 1 cross-sectional population (as this weight is the base from which all others will be derived), and then weights to represent other populations.

Wave 1

Population: all persons resident in a private household in the UK at the time of wave 1.

Design weights: Selection probabilities are recorded for all samples, so design weights can be straight-forwardly calculated as their reciprocal, as outlined in section 1 above.

Non-response adjustments: Appropriate models will be developed to predict a binary response outcome variable. The model-predicted response propensities can either be used directly to create weights, or to create classes within which either mean predicted propensity or mean observed response rate can be used to determine the weight. Model covariates will largely depend on the available data (see below). It would be possible to derive weights separately for contact and co-operation, but the benefits of doing so are unclear. The MAC advised that correction for wave 1 non-response is likely to be of particular importance. A thorough investigation and report on wave 1 non-response is suggested, including comparison of sample distributions with data from various external sources.

Post-stratification: Matrix weighting or raking (IPF) will be used, depending largely on data availability.

Scaling: Each weight variable will be scaled to a mean of 1.0.

Trimming: Variance estimation and sensitivity analysis should inform decisions on trimming outlier weights. Example y-variables such as key measures of income and health could be used in this evaluation.

Longitudinal Populations

Population: all persons resident in a private household in the UK at the time of wave 1 and resident in the UK at the time of all other relevant waves¹⁰.

Design weights: carried forward from wave 1.

Non-response adjustments: Several variants are possible. One extreme is to fit a single model of response to all relevant waves conditional on response at wave 1. The other is to fit $(m-1)$ models if there are m relevant waves, where each wave models response conditional on the previous relevant wave. In the latter case, the weight is derived as the product of the weight from each model. Other variants are between these extremes and we have done some research on BHPS data which suggests that these approaches may be preferred¹¹.

Post-stratification: Population statistics are not available for longitudinal populations. The bigger the time gap between the first and last relevant wave, the less likely it is that cross-sectional statistics will serve as a good proxy. And there are no statistics for the subpopulation of movers into institutions during a particular period. It is unlikely that post-stratification can be included as a final step for longitudinal weights. However, the wave 1 post-stratification adjustment could be included provided wave 1 sample members who do not belong to the longitudinal population¹² are all correctly identified and included as respondents rather than non-respondents in subsequent response models. New-borns who enter the sample after wave 1 could either be treated for weighting purposes – at waves prior to birth – as eligible and responding or as ineligible. We favour the former as the latter would result in them receiving a zero weight for all wave combinations that include pre-birth waves. There is a directly analogous issue with sample members who turn 16, with regard to the individual interview weight.

¹⁰ Persons moving into institutions after wave 1 remain eligible; thus, over time the sample becomes increasingly representative of the entire population. It will, of course, be possible for analysts to identify persons in institutions and exclude them from analysis if they wish.

¹¹ E.g. for the combination of waves 1+2+3+4+5, three models could be fitted: 2|1, 3|2 and 4,5|3. Separate models for earlier waves may be appropriate if response patterns differ at these waves to later waves and/or the volume of non-response is higher, whereas a common model may be appropriate for later waves.

¹² i.e. deceased or emigrated.

Ex-BHPS sample: This sample already has wave 18 BHPS longitudinal weights, which are post-stratified design weights adjusted for successive waves of non-response. This weight could form the base weight for weighting from wave 2 onwards or we could return to the wave 1 (1991) base weight and use a new adjustment strategy.

Cross-sectional Populations Subsequent to Wave 1

Population: all persons resident in a private household in the UK at the time of wave *n*. Sample members currently in institutions should therefore receive a zero weight (unlike for longitudinal populations). However, the population definition could be revised to include the institutionalised population at some (much) later wave when sample coverage has extended to a large proportion of institutionalised persons.

Design weights: carried forward from wave 1.

Non-response adjustments: A longitudinal adjustment can be used, as described above, for a combination of waves ending in the wave of interest. The weight share method (Lavallée, 2007) can then be used in order to include temporary sample members (in-movers).

Post-stratification: It should be possible to use population statistics for the relevant year. This could either be instead of, or in addition to, including the wave 1 post-stratification adjustments in the way described above for longitudinal populations.

3.6 Data Sources: Covariates for Non-Response and Post-Stratification Adjustments

Wave 1 Non-response

Sampling strata indicators and variables which define the strata;

Sample month/quarter;

Region or other geographical aggregates of postcode sectors;

Other Census postcode sector variables;

Deprivation indices (IMD, Townsend, Carstairs) and other geographically-referenced indicators;

Interviewer observation variables regarding the dwelling and immediate surroundings;

Household grid and household questionnaire data (for individual and self-completion non-response)

Individual questionnaire data (for self-completion non-response)

Wave 1 Post-stratification

Office for National Statistics mid-year population estimates by age, sex and region

Longitudinal Non-response

All sources available for wave 1;

All survey data from previous waves.

3.7 Other Issues

Modes

Issues raised by possible mixed-mode waves, and changes of mode between waves, should be considered. It is likely that non-response models may be quite different for different modes.

Revisions

Weights could be revised in the light of subsequent information. For example, 2011 Census results will become available in 2012-13 at which point they could be used to post-stratify the 2011 samples.

User Support

We believe it is inevitable that a large number of weight variables will be provided to users¹³. We will need to provide them with clear guidance on which weight to use for which analytical purpose. We will produce a user guide to weighting and run sessions on weighting at user group meetings.

¹³ We have estimated that the number of weights required after five waves of UKHLS could be more than 4,500. The number is derived from an unbalanced combination of 31 combinations of waves, 17 sample bases and 9 survey instruments. It may turn out that not all of these weights are needed, but the number of weights will remain large.

Provision of Design Weights

We propose to provide design weights to users as an additional variable. This is to service a demand from analysts who wish to use design weights without non-response adjustment.

Additional Data Releases

There are plans to release data from year 1 of wave 1 in late 2010 in order to encourage early use of the data. We propose to include basic sets of weights with this release, along the lines of those described above for wave 1 cross-sectional population, though not necessarily for all instruments/ instrument combinations (see the appendix).

Appendix: Plan for Weighting for the first *Understanding Society* Data Releases

Introduction

A first release of UKHLS data will take place in late 2010. This will consist of wave 1 data for all main sample cases in the first twelve months of the sample. A second data release is planned for 2011, consisting of wave 1 and 2 data for all innovation panel sample cases. This paper, which was adopted by the *Understanding Society* Executive Team on 7-4-2010, describes the nature of weights to be derived and included with these two releases. It should be noted that neither ethnic minority boost sample cases nor ex-BHPS sample cases will be included in the first release.

The weights for the first early release will be a simplified subset of the weights that will be produced in due course for the full wave 1 release.

Main Sample, Wave 1, Year 1

We will produce (cross-sectional) weights for the following:

- All households enumerated;
- All individuals enumerated;
- All individuals completing the individual interview in person (or youth questionnaire in the case of 10-15 year-olds);

Each weight will consist of:

- Design weight;
- Non-response adjustment;
- Post-stratification adjustment.

Design weights are equal for all persons and households, except in two respects:

- households at an address where more than three households were found have higher design weights. This is because households were subsampled at such addresses;
- households in Northern Ireland have a design weight that is approximately four times that of households in England, Scotland and Wales. This is because Northern Ireland was over-sampled by a factor of approximately 2.0, in addition to which all of the Northern Ireland was allocated to fieldwork year 1.

Non-response adjustments will be based upon weighting classes derived from simple models of non-response, where the covariates may include stratification variables, other sector-level Census variables, and interviewer observations. The adjustment is to be made in two stages, corresponding to household and individual non-response respectively.

Post-stratification adjustments will be based on mid-year population estimates for 2009 (age, sex, region).

Note:

- we are not proposing for this release a separate weight for respondents to the self-completion questionnaire. Analysts interested in self-completion data can use the weights for respondents to the individual interview;
- we are not proposing for this release to produce weights for proxy respondents.

Innovation Panel, Waves 1 & 2

We will produce weights for the following:

- All households enumerated at wave 1;
- All individuals enumerated at wave 1;
- All individuals completing the individual interview in person at wave 1;
- All households enumerated at wave 2;
- All individuals enumerated at wave 2;
- All individuals completing the individual interview in person at wave 2;
- All individuals completing the individual interview in person at both waves (longitudinal weight);

The three sets of wave 1 weights will consist of the same components as specified above for the main sample release (except that post-stratification will be based on 2008 mid-year estimates).

The wave 2 longitudinal weights will be based on the wave 1 individual weights, with an additional non-response adjustment (for non-response at wave 2 conditional upon response at wave1). Covariates for this adjustment may include variables collected (for the full sample) in the wave 1 interview, in addition to those specified above for wave 1 non-response adjustment.

The wave 2 cross-sectional weights for interviewed individuals will be based on the wave 2 longitudinal weights, with application of the weight-share method in households containing individuals not interviewed at wave 1.

The wave 2 cross-sectional weights for enumerated individuals will be based on the wave 1 weights, with a wave 2 non-response adjustment and application of weight-share.

The wave 2 cross-sectional household weights will be the mean of the wave 2 cross-sectional weights for enumerated individuals.

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