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Nonresponse in Address-Based Surveys

Carla Xena and Olena Kaminska

(University of Essex)

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Non-technical summary

Many surveys choose participants based on their addresses, so that their design accounts for the representativeness of contextual characteristics. This gives researchers access to information about the neighbourhoods where people live. By using this address information, researchers can connect it to other sources of data, such as Census information, to learn more about the areas where participants live. For example, they might find out how many retired people live in each neighbourhood included in the survey. This extra information helps researchers understand more about the communities taking part in the study.

In this project, we looked at a group of households in England and Wales invited to join the UK Household Longitudinal Study (UKHLS) in wave 14, held between January 2022 and December 2023. We linked information about these people's neighbourhoods to our data and then compared the neighbourhoods of those who took part in the survey to those who did not. For instance, we wanted to know if people who answered the survey were more likely to come from areas with more retired residents. We looked at a large number of neighbourhood features to find the ones that showed the biggest differences between the two groups.

We also looked at different levels of participation. For example, we compared households where everyone answered the survey to those where only one person did. We also studied in which neighbourhoods survey teams were able to make contact with people easier and in which people more often refused to take part.

Finally, we compared these patterns across three different ways of collecting answers. In some cases, survey teams visited people's homes in person. In others, people were asked to complete the survey online. In the third approach, people were first asked to complete the survey online, and then those who didn't respond were visited in person. By comparing these methods, we learned more about how neighbourhood information and hence lessons for future efforts to recruit participants.

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Abstract

Nonresponse is a critical challenge in surveys aiming to be representative, necessitating effective correction strategies. To tackle nonresponse, one must identify predictors available for both respondents and nonrespondents. Address-based samples often provide limited information from the sampling frame; however, full address details can be linked to external data sources that may include predictors of nonresponse. While the quantity of external data and potential predictors is vast, linking such data is a labour-intensive and costly task.

In this paper, we utilize linked datasets and systematically evaluate a large volume of potential predictors to identify the most significant ones. We also assess the stability of these predictors across different modes of data collection. Using data from the wave 14 boost sample of UKHLS, we analyse nonresponse predictors for face-to-face first with web follow up and web-first followed by face-to-face. Our findings will guide researchers working with address-based samples by identifying the most influential nonresponse predictors and offering practical insights for survey design and implementation.

Keywords: nonresponse bias, address-based sampling, adaptative survey design.

JEL classification: C81, C83

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Corresponding author: Carla Xena, Institute for Social and Economic Research, University of Essex, Wivenhoe Park, Colchester, Essex CO7 9FJ, United Kingdom. Email: cxenag@essex.ac.uk.

1. Introduction

Declining response rates pose a significant challenge for surveys, making nonresponse a priority concern for survey methodologists. Addressing nonresponse involves two primary strategies: prevention and correction. Nonresponse prevention can occur during fieldwork by, for example, prioritising areas expected to yield lower response rates. However, this requires prior knowledge of nonresponse predictors for the sampled points. Alternatively, fieldwork adjustments can be made during data collection, though this also necessitates identifying relevant predictors to be observed during fieldwork. Finally, nonresponse bias can be corrected post-fieldwork, which similarly relies on predictors of nonresponse.

This study focuses on address-based samples, where address information can be linked to external datasets, such as neighbourhood-level data. In an increasingly digital world, large datasets offer opportunities to identify numerous potential predictors of nonresponse. However, linking and standardising these datasets can be time-consuming and expensive. Additionally, not all predictors are equally informative, and focusing on those with the highest predictive power can be helpful.

The aim of this paper is to identify the most predictive externally linked neighbourhood characteristics for nonresponse. Specifically, we focus on four key outcomes: full household response, partial and full household response, contact rate, and refusal rate. We investigate whether the same predictors are relevant for each outcome and examine their stability across two data collection modes: face-to-face first (with web follow up) and web-first (followed by face-to-face). Our analysis uses data from the wave 14 boost sample of UKHLS, an address-based household panel in the UK. Sampled units' addresses were available for linkage to external datasets. The administrative data used in this paper has been retrieved from the 2021 Census published by the Office for National Statistics (ONS).

This paper is structured as follows. First, we describe the design and characteristics of Understanding Society wave 14 boost sample. Next, we describe the data, define the outcomes, and explain the mode contexts. We then present the most significant predictors, with full details provided in the appendix. Subsequently, we compare predictors across outcomes and modes. We summarise the main lessons learnt about

household nonresponse. Finally, we conclude with practical recommendations for survey methodologists addressing nonresponse in address-based samples.

2. Understanding Society wave 14 boost sample

The UKHLS succeeded the BHPS study (since 1991) began in 2009 and it initially interviewed about 40,000 in its first wave. The study collects data about all household members annually. Wave 14 of the study included a general population boost sample.

The boost sample was clustered in Great Britain and unclustered in Northern Ireland. The sampling frame included 8679 primary sampling units (postcode sectors) in Great Britain. Using implicit stratification, the units were sorted by region, urbanisation, index of multiple deprivation, ethnic diversity and, by local authority. After the sorting, a systematic sample of 960 primary sampling units was drawn. In Northern Ireland, a systematic equal probability sample of 1536 addresses was drawn. Prior to sampling, the Postcode Address File for Northern Ireland was sorted by local authority, urbanisation, index of multiple deprivation, super output area, census output area, postcode and first line of addresses.[1]

The sample was released for fieldwork in 24 monthly random batches, starting in January 2022 and concluding in December 2023. The fieldwork initially was planned for a 50/50 split between face-to-face first and mixed (web-first) modes but this was adjusted due to concerns about in-person visits post-Covid-19. As a result, the first quarter's allocation was adjusted to 80% web first and 20% face-to-face first, prioritising online participation. In quarters 2 to 4, the original 50/50 split was reinstated, but from quarter 5 onward, the allocation returned to 80% web first and 20% face-to-face first, as web-first households had achieved higher response rates earlier in the year. The allocation to modes was random.

For web first mode there was a 5-week online fieldwork period after which nonresponding households were assigned to face-to-face interviewers. At the same

[1] Further specification about the sample and fieldwork designs can be found here: "Understanding Society: Wave 14 Boost Technical Report." Verian. (2024, October). Retrieved from https://www.understandingsociety.ac.uk/wp-content/uploads/documentation/main-survey/technical-reports/6614-main-survey-boost-technical-report-w14.pdf

time, 19 weeks before the end of fieldwork, both face-to-face first and nonresponding web-first samples were issued to interviewers. During the whole period, the web survey remained open so web-first households could still complete online even after being issued to an interviewer.

Since all members of the boost sample were new to the study, the first contact was made sending letters addressed to "Dear resident" to their home address (the names of the household participants were unknown). All letters, branded with Understanding Society and signed by its director, included information about the study and a leaflet on Covid-secure protocols. There were slight differences between the letters sent to the face-to-face first and web first samples. Face-to-face first sample households, received a letter before the start of face-to-face fieldwork for that month, informing them that an interviewer would visit soon. For the web-first sample a notification letter was sent one week before the start of web fieldwork, informing them that instructions for completing the survey online would follow. On the first day of web fieldwork, they were sent an invitation letter containing a web link and login details, with a note that an interviewer would reach out if they were not able to complete the survey online.

At the beginning of 2023 (January – March), an experiment was carried out to examine whether the use of government logos on envelopes and QR codes, respectively, had an impact on response rates. In the light of positive results, from April all envelopes and letters included a government logo, and all letters inviting to complete the web survey included a QR code as well. At the same time (quarter 5 of issued sample), there was a £5 unconditional incentive included in advance letters (half the sample). The positive impact on response rates led to its adoption for the whole sample from April.

Reminder letters were sent to all those web-first households who had not opted out of the survey and hadn't started the household grid or, had only completed the household grid and/ or household questionnaire (but no individual interviews). All participants were offered a £20 gift card conditional on answering the survey[2]. In addition, web-first respondents were offered an extra £10 gift card if they completed the survey within

[2] This incentive, conditional upon completing the survey, is not strictly linked to responding the household questionnaire. The first eligible household member to log in would complete both the household and individual interviews simultaneously. Young people (aged 10 - 15) were offered a £10 incentive conditional on completing the paper questionnaire.

the first five weeks. The £10 incentive was reintroduced at the last three weeks of fieldwork for web-first respondents for online completion of the survey.

3. Data

3.1 Definitions

In this paper, we focus on four main outcomes. We classify our outcomes according to the definitions by the American Association for Public Opinion Research (AAPOR)[3]. First, *full household response*, where all eligible members of the household complete an adult interview. Second, *partial and full household response* which includes the previous outcome but also those households where a household interview was completed but not all eligible adults provided interviews. This includes households where interviews and proxies were carried out or, interviews and refusals or, the household grid and household questionnaires only were completed or, the household grid and individual questionnaires were completed (but no household questionnaire) or household grid and proxies were completed. Third, *noncontacts* include the following categories: no household member contact, unable to locate address, address inaccessible and other noncontact. Fourth, *household refusals* (either to the research centre or to the interviewer). Addresses with the following outcomes were considered ineligible and were not included in any of the above formulae: demolished/derelict address, non-residential, empty at first call, building not complete, institution (not private household) and, address not found.

We analyse nonresponse predictors for the two survey modes described in the previous section: face-to-face first and web first.

Table 3.1 below describes our four outcome variables. In line with the declining trend in response rates over the past decade(s), full household response rates are 13.98% in England and Wales and slightly better in Northern Ireland (16.78%) and Scotland (18.05%). A similar pattern emerges when we additionally include partial household response rates as well where England and Wales still do worse than their Northern Irish and Scottish neighbours.

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[3] "Standard Definitions. Final Dispositions of Case Codes and Outcome Rates for Surveys" The American Association for Public Opinion Research. (2023) p.87.

Interestingly, the key factors behind nonresponse seem to differ across nations. In England and Wales, there are similar rates of noncontacts (34.79%) and refusals (36.4%). In contrast, the main drivers of nonresponse in Scotland and Northern Ireland seem to be refusals (43.7% and 40.08%, respectively). Despite falling beyond the scope of the present paper, this variation in nonresponse drivers calls for further examination, as it could help refine distinct strategies for improving survey participation and representativeness across nations.

Table 3.1 Distribution of household outcome variables

(Percentages. n in parentheses)

	Full response rate	*Partial and full response rate*	Noncontact	*Refusals*
Overall	14.45 (3607)	24.58 (6137)	33.77 (8433)	37.20 (9288)
England and Wales	13.98 (3063)	24.16 (5293)	34.79 (7621)	36.4 (7974)
Scotland	18.05 (423)	28.47 (667)	24.42 (572)	43.7 (1024)
Northern Ireland	16.78 (121)	24.55 (177)	33.29 (240)	40.08 (289)

Note: percentages are calculated over the total number of households eligible to take part in the survey.

Table 3.2 shows the distribution of the four outcomes by survey mode in England and Wales. The response rates vary across survey modes. Face-to-face first shows the lowest full response rate (10.33%) and the highest refusal rate (43.68%). When it comes to nonresponse, refusals are 11 percentage points lower in the mixed mode (web-first) design whereas noncontacts appear to be very similar in both modes. Web-first surveys have a higher full response rate (15.9% vs 10.33%) and a combined partial and full response rate 10% higher than face-to-face first (27.77% vs 17.28%). These differences suggest that survey mode influences both full and partial participation, with web-first performing better than *only* face-to-face first interactions.

Table 3.2 Distribution of outcome variables by mode

(Percentages, England and Wales)

	Full response rate	*Partial and full response rate*	*Noncontact*	*Refusals*
Face-to-face first	10.33	17.28	34.44	43.68
Web-first	15.9	27.77	34.98	32.59

Note: percentages calculated over the total number of households eligible to take part in the survey.

3.2 Census Data

We use data from the 2021 census (97% response rate), published by the Office for National Statistics[4]. We derive proportions for the variables of interest at the Lower Layer Super Output Areas (LSOAs) level. Each LSOA includes between 400 and 1,200 households and has a resident population ranging from 1,000 to 3,000 people. After recoding the original census variables, we end up with a total of 106 variables in the form of proportions of households /people with specific characteristics within LSOA.

The population being described differs from variable to variable. For most cases, the population is either "All usual (household) residents", "All adults in the household" or the "Household reference person"[5]. For each geographical area and variable, the proportions are based on the count of residents in a specific category (or combination of categories), relative to the total of residents for that variable.

[4] This paper includes *all* variables available on the ONS website at the time this draft was produced.

[5] For a small number of questions, the population of reference is neither all usual residents nor adults but all usual residents *over* a certain age. This is the case of linguistic skills and other language related variables where questions asked refer to usual residents over 3 years of age.

4. Results

We tested 106 of predictors of nonresponse for England and Wales for the four outcomes of interest and two different modes. The results are shown in Table 1 in the Appendix. We use the software Stata version 18 and use the command option svy to account for the survey design (equal probability) and we account for clustering and stratification when comparing outcomes between designs. For each of the census variables, we first calculate an overall mean neighbourhood value (proportion of characteristic) across our sample. We then present the mean neighbourhood value among full household respondents, among partial and full household respondents, among contacted households and among households that refused to participate in the panel. The significance test is conducted for each category separately (e.g. respondents vs. nonrespondents; noncontacts vs. contacts; and refusals vs. nonrefusals). The significance test therefore identifies whether respondents are significantly different from nonrespondents in terms of proportion of characteristics in neighbourhoods. Similarly, whether contacted households or those that refuse come from different types of neighbourhoods.

The four household response outcomes under study (full response, partial and full response, contact and, refusal) are dichotomous, coded 1 when the outcome takes place and 0 otherwise. To enhance clarity and reduce the complexity of the tables, we only present the mean when the response outcome is 1. Table 4.1 below provides an example for one of the predictors following the same structure as Table 1 in the Appendix. The overall mean proportion of single parent households in the sampled LSOAs is 0.069. In face-to-face first, the mean proportion of this variable for respondents (full household response) is 0.066. These differences remain and become significant at p=0.001 once partial responses are considered in face-to-face first. In mixed mode, we observe differences for partial and full response (p=0.001 both). Where an association between *single parent household with dependent children* and response exists, this is negative. Contact and refusal do not appear to be associated with the variable in either mode.

Table 4.1 England and Wales: Single parent household with dependent children, response outcome variables by mode (mean values, proportions)

MODE:	Face- to- face first				Mixed (Web first)			
Overall	Full	Partial & full	Contact	Refusal	Full	Partial & full	Contact	Refusal
0.069	.066*	.066***	.068	.069	.069	.068***	.069	.070

Note: ***p<0.01, **p<0.05, *p<0.1.

Table 4.2 below presents these percentages at p<0.05. These are percentages of predictors associated with response outcomes by mode after applying a Bonferroni correction where the original p value has been divided by the total number of tests performed (106) to assess significance. The corrected p value equivalent to p<0.05 is p<0.0005. In face-to-face first mode we find that about 16% of the census variables are related to full household response at this significance level. Once partial response is added, this percentage increases slightly, by 2 percentage points. Similarly, about 17% of our predictors are associated with contact. The association with refusals seem to be less frequent with only 5.6% of the variables considered being statistically associated at this significance level.

For web first, more predictors are associated with each of the outcome variables. We find that 23.6% of our variables are associated with full response and this number raises to a striking 51% once partial responses are added. In the face-to-face (second) stage of the web first design, we also observe a remarkable 51% of predictors at the LSOA level associated with contact but a much more modest 6.6% is associated with refusals.

Table 4.2 Percentage of predictors associated with household response outcomes, by mode

MODE:	Face- to- face first				Mixed (Web first)			
Significance	Full	Partial & full	Contact	Refusal	Full	Partial & full	Contact	Refusal
Bonferroni corrected p<0.05 (incl.p<0.01)	16	17.92	16.98	5.66	23.58	50.94	50.94	6.6

The number of predictors associated with response varies by mode. However, given that full household response and partial and full household response are closely related

outcomes, we find that predictors associated with either outcome are of similar nature in the two survey modes under examination. Most significant predictors come from topics such as type of household composition (family structure), ageing population, type of tenancy, employment status, deprivation, health / disabilities, language and ethnicity, where is the respondent born / passport nationality or number of years resided in the UK. Some topics related to housing (type of house, number of bedrooms, type of central heating) do not seem to be particularly predictive of response in either mode.

In both face-to-face first and web first mode our predictors do better in explaining contact than refusal. This difference is especially remarkable in the case of web first. The relationship between our predictors and contact and refusal, respectively, usually works in the same direction. This is because being contacted is a pre-condition to be able to refuse to take part in the survey.

A typical neighbourhood in England and Wales with higher contact rate, for both face-to-face first and web-first modes, would be more likely to have more households with home ownerships and less rentals, less flats, more detached and semi-detached houses, less shared houses, less full-time students, more retired people, more adults over 66 years of age, less adults in employment, more non-mixed ethnic groups in the household, more white, less households deprived in the housing dimension, more with English as a main language, married or in a couple, households with four or more bedrooms, more UK passport holders and fuller houses (high occupancy ratings per room/bedroom).

Similarly, a typical neighbourhood where refusals are high, would likely have more homeowners, fewer rentals, fewer flats and shared houses, fewer full-time students, fewer adults under 65, fewer adults in employment, more ethnically homogeneous households, more households with four or more bedrooms, with English as a main language and, more UK passport holders.

Some differences emerge when comparing face-to-face first and mixed modes. In mixed mode, households without adults in employment have higher contact and refusal rates. Interestingly, variables related to disability are associated with contact and refusal in mixed mode whereas they aren't in face-to-face first. In this sense, neighbourhoods with more households without disabled people and adults are less likely to be contacted and to refuse in mixed mode. Conversely, in this web first setting, where there are one

or more disabled adults, contact and refusals are more likely to happen. In a web-first design, areas with more households deprived in the education dimension are more likely to refuse taking part in the survey and those with more deprived in the housing dimension are less likely be contacted and take part whereas those with more households deprived in the health and disability dimension are more likely to both be contacted and take part. In contrast, predictors related to deprivation mostly do not matter for contact and refusal in a face-to-face first context.

5. Lessons Learned

One key finding is that the majority of tested variables were not significantly associated with contact, refusal, or overall household-level response. This suggests that, for these variables, there is no evidence of nonresponse bias in the dataset, and therefore no further adjustment is needed. This is a positive result, as it indicates that—regardless of the overall response rate—these variables remain unaffected by nonresponse bias. However, it's important to note that this finding holds only under high-quality fieldwork protocols, such as those used in this study. It should not be generalised to studies with lower response rates or very different in quality fieldwork practices.

When we compare nonresponse patterns between noncontacts and refusals, we find that while some factors affect both in the same way, many affect them in opposite ways. For instance, neighbourhoods with a higher proportion of homeowners and a lower proportion of flats and rentals tend to have *lower* noncontact rates and *higher* refusal rates. In such cases, the opposing effects may partially cancel out, resulting in a smaller overall bias. This highlights the importance of addressing both noncontact and refusal simultaneously in fieldwork design—focusing on only one aspect may inadvertently increase overall nonresponse bias if the two effects act in opposite directions.

We also observe differences in nonresponse bias across study modes for certain variables. This is particularly notable given that both mode settings use the same data collection modes —face-to-face and web—differing only in the order in which they are offered. One might expect that any bias would balance out by the end of the fieldwork period. However, for some variables—especially those related to disability and deprivation—this is not the case. This suggests that the order in which modes are offered can influence who is more likely to respond. Further investigation is needed,

but these findings imply that data collection agencies might improve response quality by tailoring the starting mode based on known neighbourhood characteristics associated with response propensity.

6. Conclusion

While the nonresponse patterns identified in this study do not pose a problem for UKHLS due to the use of all these predictors in weighting adjustments, the findings provide valuable insights for improving nonresponse strategies in future research. Linking external data sources to an address-based sample has proven to be an effective approach for understanding nonresponse mechanisms and can be applied to other studies seeking to enhance post-survey corrections and reduce bias.

The results also highlight the potential for more tailored fieldwork strategies. By identifying specific predictors that are effective in explaining nonresponse, survey teams can design targeted interventions to improve participation. Distinct predictors for noncontact and refusal suggest that these processes require separate approaches, allowing fieldwork efforts to be optimized at the neighbourhood level. Rather than relying solely on post-hoc weighting, strategic adaptations in data collection could mitigate nonresponse bias from the outset.

Moreover, this study enhances our understanding of nonresponse at the neighbourhood level, offering insights into how local characteristics influence participation. These findings can inform the development of more effective engagement strategies, such as improved contact procedures and targeted outreach efforts to encourage response at the first point of contact.

By applying these insights, future studies can refine both nonresponse correction methods and survey implementation strategies, ultimately improving data quality in address-based and longitudinal surveys.

References

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Appendix

Table 1. Predictors of non-response for England and Wales by outcome and survey mode (mean values, proportions)

		FACE-TO-FACE FIRST				WEB FIRST (MIXED)			
Variable proportion	**Overall mean**	**Full**	**Partial & full**	**Contact**	**Refusal**	**Full**	**Partial & full**	**Contact**	**Refusal**
Single parent hhd (dependent children)	0.069	0.066*	0.066**	0.068	0.069	0.069	0.068***	0.069	0.070
One person household	0.303	0.310**	0.302	0.299***	0.298***	0.310***	0.301*	0.300***	0.299**
UK born	0.835	0.859***	0.857***	0.846***	0.844	0.853***	0.852***	0.850***	0.850***
EU born	0.061	0.055***	0.056***	0.058***	0.058**	0.057***	0.056***	0.056***	0.056***
Male	0.490	0.490	0.490	0.489*	0.489	0.489	0.489	0.489**	0.488***
Non deprived	0.486	0.483	0.490	0.488	0.487	0.484	0.491***	0.485	0.481
Extremely deprived	0.002	0.002	0.002*	0.002	0.002	0.002	0.002***	0.002	0.002
Migrant within the UK	0.095	0.094	0.093	0.091***	0.089***	0.096	0.094	0.091***	0.088***
No cars	0.232	0.227	0.220**	0.222***	0.221**	0.230	0.219***	0.222***	0.224**
More than 2 cars	0.354	0.360	0.367**	0.364***	0.364**	0.354	0.366***	0.364***	0.363**
Tenancy: social rent	0.169	0.163	0.159**	0.164	0.166	0.171	0.164***	0.167	0.170
Tenancy: ownership	0.614	0.622	0.632**	0.630***	0.630***	0.611	0.625***	0.625***	0.627***
Tenancy: ownership without mortgage	0.325	0.337**	0.340***	0.335***	0.333**	0.325	0.332***	0.333***	0.335***
Tenancy: rental	0.206	0.204	0.198	0.196***	0.194***	0.206	0.200***	0.196***	0.192***
Unemployed	0.068	0.066	0.066**	0.067	0.068	0.067*	0.065***	0.067*	0.069
Full time students	0.060	0.057	0.056	0.054***	0.053***	0.059	0.058**	0.055***	0.053***
Retired	0.179	0.190***	0.188***	0.184***	0.182	0.183*	0.185***	0.185***	0.186***
Detached houses	0.233	0.243	0.248*	0.244***	0.242	0.229	0.244***	0.242***	0.242**
Semidetached houses	0.310	0.309	0.316	0.318**	0.321**	0.313	0.316*	0.318***	0.320**
Terraced houses	0.233	0.233	0.231	0.232	0.231	0.238	0.233	0.236	0.237
Flats	0.172	0.163	0.155***	0.159***	0.160**	0.168	0.157***	0.156***	0.155***
Shared houses	0.031	0.029	0.029	0.028**	0.027***	0.029	0.029*	0.028***	0.027**
One adult > 66y	0.127	0.135***	0.132***	0.130***	0.129	0.132***	0.130**	0.131***	0.132***

- Table 1 continued -

Variable proportion	Overall mean	FACE-TO-FACE FIRST				WEB FIRST (MIXED)			
		Full	Partial & full	Contact	Refusal	Full	Partial & full	Contact	Refusal
Two adults >66y no kids	0.091	0.097**	0.097***	0.095***	0.094*	0.093	0.095***	0.095***	0.095***
Two adults <65y no kids	0.182	0.182	0.183	0.180***	0.180***	0.184*	0.183	0.181**	0.179***
Two or more adults w. kids	0.209	0.201***	0.205**	0.210	0.213**	0.202***	0.207	0.208	0.209
Three or more adults w/o kids	0.124	0.120***	0.123	0.124	0.125	0.120***	0.123**	0.124	0.125
No adults in employment	0.341	0.352***	0.346**	0.342*	0.341	0.347***	0.344	0.346***	0.347**
One adult in employment	0.299	0.295*	0.293***	0.296***	0.296**	0.298	0.295***	0.295***	0.294***
Two adults in employment	0.290	0.287*	0.293	0.293	0.293	0.289	0.293***	0.290	0.288
One bedroom household	0.116	0.115	0.108**	0.108***	0.108***	0.118	0.110***	0.109***	0.108***
Two bedroom household	0.272	0.274	0.269	0.267**	0.267*	0.278**	0.269	0.268***	0.268*
Four bedroom household	0.213	0.211	0.219	0.218**	0.217	0.208	0.221***	0.216***	0.214
No central heating	0.015	0.016*	0.016	0.015	0.014**	0.015	0.015***	0.015***	0.015**
Gas central heating	0.732	0.722*	0.728	0.742**	0.747***	0.725**	0.731	0.738**	0.742**
Electric central heating	0.089	0.090	0.086	0.083***	0.081***	0.090	0.085**	0.082***	0.080***
Oil, wood or solid fuel central heating	0.041	0.047	0.048**	0.041	0.038	0.046**	0.046***	0.043**	0.041
Dependent children in household	0.285	0.274***	0.279***	0.286	0.289**	0.279***	0.282	0.285	0.286
No disabled adults	0.696	0.689***	0.693*	0.695*	0.695	0.690***	0.694	0.692**	0.690**
One or more disabled adults	0.304	0.311***	0.307*	0.305*	0.305	0.310***	0.306	0.308**	0.310**
No disabled people	0.680	0.673***	0.676*	0.678*	0.679	0.674**	0.678	0.675**	0.673***
Disabled people little limited	0.798	0.792***	0.794***	0.796**	0.797	0.793***	0.794**	0.794***	0.794**
Disabled people limited a lot	0.853	0.850	0.853	0.852	0.851	0.850	0.854**	0.851	0.848***
Same ethnic group in household	0.596	0.599	0.604**	0.603***	0.603***	0.594	0.602***	0.603***	0.605***
Multiple ethnic groups in household	0.101	0.091***	0.094***	0.098**	0.099	0.096***	0.097***	0.097***	0.095***
One family household	0.653	0.649*	0.656	0.660***	0.662***	0.648**	0.657**	0.659***	0.660***
Multiple families household	0.014	0.013**	0.014	0.014	0.015	0.013***	0.013***	0.014	0.014

- Table 1 continued -

Variable proportion	Overall mean	FACE-TO-FACE FIRST				WEB FIRST (MIXED)			
		Full	Partial & Full	Contact	Refusal	Full	Partial & Full	Contact	Refusal
Household deprived in education	0.214	0.217	0.212	0.214	0.215	0.216	0.211***	0.216	0.219***
Household deprived in employment	0.118	0.116	0.113**	0.116	0.118	0.118	0.115***	0.117*	0.119
Household deprived in health & disability	0.327	0.334***	0.330*	0.329*	0.328	0.333**	0.329	0.332**	0.334***
Household deprived in housing	0.077	0.072	0.070***	0.072**	0.073	0.073***	0.071***	0.072***	0.073**
Main language English or Welsh	0.892	0.910***	0.909***	0.901***	0.899	0.907***	0.907***	0.903***	0.902**
No people English/Welsh as main	0.050	0.042***	0.042***	0.045***	0.046**	0.045***	0.043***	0.044***	0.044***
Multiple main languages in household	0.062	0.051***	0.053***	0.058**	0.060	0.053***	0.054***	0.057***	0.058
Multiple religions in household	0.012	0.010***	0.011***	0.011**	0.011	0.011***	0.011***	0.011***	0.011***
Same religion in household	0.330	0.317***	0.322**	0.330	0.334*	0.315***	0.323***	0.328	0.331
No religion in household	0.201	0.207*	0.208***	0.204	0.203	0.208***	0.208***	0.205***	0.204
Served armed forces	0.055	0.059***	0.058***	0.056***	0.056	0.058***	0.058***	0.057***	0.057***
Large household (4+ people)	0.198	0.188***	0.193**	0.199	0.201**	0.189***	0.194**	0.197	0.199
Small household (1 person)	0.303	0.310**	0.302	0.299***	0.298***	0.310***	0.301*	0.300***	0.299**
Students away term time	0.024	0.023	0.024	0.024	0.024	0.023**	0.024**	0.024	0.024
Married or couple	0.547	0.547	0.554	0.554***	0.555***	0.541	0.552***	0.552***	0.552**
Lone parent	0.121	0.115***	0.116***	0.120	0.122	0.119*	0.118***	0.121	0.123
Four or more bedrooms (VOA)	0.659	0.659	0.671*	0.671***	0.671**	0.652*	0.668***	0.670***	0.672***
Low occupancy rating per bedroom	0.043	0.037***	0.037***	0.040*	0.042	0.039***	0.038***	0.040***	0.041
High occupancy rating per bedroom	0.358	0.367	0.373***	0.368***	0.366	0.357	0.370***	0.367***	0.365**
Low occupancy rating per room	0.063	0.057**	0.055***	0.059**	0.060	0.058***	0.057***	0.059***	0.059**
High occupancy rating per room	0.458	0.465	0.475***	0.470***	0.467	0.456	0.470***	0.468***	0.466**
No one l/t health condition	0.512	0.499***	0.506**	0.513	0.515*	0.500***	0.509	0.510	0.511
One person with l/t health condition	0.123	0.125*	0.127***	0.125**	0.124	0.125***	0.126***	0.125***	0.124

- Table 1 continued -

		FACE-TO-FACE FIRST				WEB FIRST (MIXED)			
Variable proportion	**Overall mean**	**Full**	**Partial & Full**	**Contact**	**Refusal**	**Full**	**Partial & Full**	**Contact**	**Refusal**
Min. 2 people with l/t health condition	0.018	0.018	0.019***	0.018***	0.018	0.018*	0.019***	0.018***	0.018
Min. 1 person served armed forces	0.069	0.074***	0.074***	0.071***	0.071	0.073***	0.073***	0.073***	0.073***
Up to 0.5 people per bedroom	0.286	0.293**	0.294***	0.289*	0.287	0.290**	0.292***	0.289***	0.288
More than 1 person per bedroom	0.714	0.707**	0.706***	0.711*	0.713	0.710**	0.708***	0.711***	0.712
Up to 0.5 people per room	0.556	0.571***	0.568***	0.560	0.557	0.564***	0.565***	0.561***	0.560
More than 1 person per room	0.444	0.429***	0.432***	0.440	0.443	0.436***	0.435***	0.439***	0.440
At least 1 drives to work	0.378	0.381	0.382	0.382*	0.384**	0.379	0.382**	0.383***	0.385***
At least 1 travels to work other method	0.193	0.185**	0.185***	0.188***	0.189	0.188***	0.186***	0.188***	0.188**
Travels to work<5k	0.112	0.113	0.112	0.111	0.110	0.112	0.110**	0.111	0.111
Travels to work >5k &<10k	0.054	0.053*	0.052***	0.054	0.055	0.055	0.055	0.055	0.055
Travels to work > 20k	0.040	0.042**	0.042***	0.041	0.040	0.041	0.041**	0.040	0.040
No educational qualifications	0.147	0.148	0.145	0.147	0.148	0.147	0.144***	0.148	0.152***
Level 1 and entry level educational qual.	0.147	0.148	0.145	0.147	0.148	0.147	0.144***	0.148	0.152***
Level 4 and above educational. qual.	0.278	0.272	0.277	0.276	0.273**	0.277	0.280*	0.274**	0.268***
White English	0.752	0.793***	0.789***	0.768***	0.761	0.783***	0.782***	0.774***	0.773**
White	0.824	0.858***	0.856***	0.838**	0.831	0.851***	0.849***	0.842***	0.840**
Asian	0.089	0.072***	0.074***	0.082**	0.085	0.073***	0.074***	0.079***	0.081
Black	0.038	0.029***	0.029***	0.034*	0.037	0.033***	0.033***	0.034***	0.034**
British national identity	0.547	0.544	0.548	0.546	0.545	0.543	0.546	0.545	0.545
English national identity	0.151	0.159***	0.158***	0.154**	0.153	0.155**	0.156***	0.155***	0.156***
Welsh national identity	0.033	0.032	0.030	0.038	0.041*	0.035	0.033	0.036	0.039
Scottish national identity	0.004	0.004	0.004*	0.004	0.004	0.004**	0.004***	0.004	0.004
Northern Irish national identity	0.001	0.001	0.001	0.001	0.001	0.001*	0.001	0.001	0.001**
Irish national identity	0.005	0.005**	0.005	0.005	0.005	0.005***	0.005***	0.005***	0.005

- Table 1 continued -

		FACE-TO-FACE FIRST				WEB FIRST (MIXED)			
Variable proportion	**Overall mean**	**Full**	**Partial & Full**	**Contact**	**Refusal**	**Full**	**Partial &Full**	**Contact**	**Refusal**
English is main language	0.884	0.899***	0.898***	0.892***	0.890*	0.894***	0.895***	0.893***	0.893***
English not main but proficient	0.037	0.031***	0.032***	0.034***	0.035**	0.034***	0.034***	0.034***	0.033***
UK residency >10y	0.095	0.081***	0.083***	0.092*	0.094	0.084***	0.085***	0.089***	0.090
UK residency <2y	0.019	0.016**	0.015***	0.016***	0.016***	0.017**	0.017***	0.016***	0.015***
UK residency >2y & <10y	0.050	0.044***	0.044***	0.046***	0.047**	0.046***	0.045***	0.046***	0.045***
UK passport	0.768	0.772	0.775*	0.775***	0.776***	0.768	0.775***	0.773***	0.774**
European passport	0.067	0.059***	0.059***	0.062***	0.063**	0.061***	0.061***	0.061***	0.061***
Other passport	0.031	0.025***	0.025***	0.027***	0.027***	0.027***	0.027***	0.027***	0.026***
Works from home	0.148	0.143*	0.148	0.149	0.148	0.146	0.149**	0.146	0.144*
Travels to work by bicycle	0.010	0.009	0.009	0.009	0.009*	0.010	0.010	0.009	0.009
Travels to work on foot	0.036	0.038***	0.037	0.035**	0.034***	0.038	0.036	0.036***	0.035***

Note: ***p<0.01, **p<0.05, *p<0.1 (raw, non-adjusted p values).