

Online access panels for surveys on public health and epidemiology

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Background

The key reasons for social, political and commercial researchers adopting online access panels include:

- Concerns about increasing non-response and associated biases with other modes of data collection, namely postal, telephone and face-to-face interviews;
- the increase in coverage of the internet;
- lower cost and speed of turnaround for online;
- the facility to show videos online; and
- an increasing belief that online access panels yield data whose level of validity is competitive compared with other collection methods (Hogg, Nadel and Miller 2000; Galea and Tracy 2007; Adams, Atkeson and Karp 2013).

It is estimated in Great Britain 87 per cent have access to the internet (Q4 2013 ONS Internet Access Quarterly Update). This is similar to the proportion of households having a landline telephone. Online studies can also be conducted internationally. However, online access varies considerably across countries, and so this would be important to check. Lower levels of online access may be associated with biases of demographics, lifestyles or technological usage.

Online research samples for surveys are typically drawn in three ways.

First, they might be drawn from lists of people with known attributes, say, a medical condition and with internet access.

Second, website forums are a potential source for accessing people with a specific interest or concern: an example would be Fox, Murray and Warm's (2002) study of self-harm. A key issue with website forum is bias - just how representative of the population of interest are visitors to a particular forum?

Finally, samples may be drawn from online access panels. So far such panels have been little used by epidemiologists and are rarely mentioned, except in passing (Lenert and Skoczen 2002). These panels comprise people who have agreed to complete surveys on a variety of topics for a commercial research agency such as YouGov, Ipsos MORI and Lightspeed. People become panellists out of interest, to feel involved, wishing their voices to be heard or in some cases for cash or prize draw incentives if they are offered.

Panellists can be recruited in various ways - from a random sample of the population, by advertising, using the researcher's websites, from published lists and from other research projects an agency has conducted. Thus, they range from a starting point of probability sampling to a convenience sample. Once recruited stratified random sampling from the panel population can be used for a specific project – strata based on personal details collected at recruitment. Typically, quotas are set on, say, demographics to mirror proportionally the population of interest's profile in terms of, say, age, gender, working status, household composition, regional breakdown, lifestyle groups (geo-demographics), online usage and any other variables that are key to attempts to achieve a representative sample on these.

Clients in the public sector as well as commercial organisations can commission research from panel operators based on a sample of panellists. Costs reflect the incidence and nature of the target population, the sample size sought, the number and types of questions and the amount of research executive time involved. Online

access panels differ from traditional notions of continuous panels where the same people answer questions on the same topic, often using the same questions or complete ongoing diaries. Online access panels can offer such continuous research but mostly cover very different topics: political, commercial and social. They typically use one-off samples and are therefore (typically) cross-sectional rather than longitudinal in nature.

When panel members are first recruited demographic information is often collected which permits for future projects very sophisticated sampling using interlocked quotas (a matrix of interlocked demographic variables) to reflect the known characteristics of a population more precisely and efficiently than is the norm with other modes of data collection. Obviously, having the demographics on the database saves future fieldwork time too. Of course the database needs to be updated as, for instance, marital status, working status and household composition may change. It is worth checking what data is on file in terms of panellists' demographics, use of social media, traditional media use, device ownership and perhaps medical conditions.

There may be panel management rules to ensure respondents are not used too often and do not get invited onto surveys on a topic they have covered in the recent past which may bias results on a new survey. There are also sophisticated ways of identifying "fraudulent" respondents, the very small number of respondents who try to minimise their input (Baker 2008, Cartwright 2008). For example, fraudulent respondents can be identified by the pattern of responses such as inconsistencies and "straightlining" of responses in grids and so on.

A number of marketing and social research agencies offer online access to panels covering various populations in Great Britain and in many other countries. In GB these include panels of adult populations managed by YouGov, Lightspeed, Ipsos MORI, GfKNOP and for children and young people ChildWise. Of course the other panels may reach children through their parents on a panel.

Public health care and attitude and behaviour research

For those with an interest in public health, health care and epidemiology there are two broad types of research on attitudes and behaviour, namely cross sectional and longitudinal research. Cross sectional surveys have fieldwork at one point in time and provide a snap shot of the human landscape. Such surveys permit examination of relationships between, say demographics, lifestyle variables and medical conditions or at risk sections of the public such as a recent study carried out by the University of West of England on self harm amongst children/young people, carried out on behalf of the South West Public Health Observatory. Of course, any correlations in cross-sectional research are indicative rather than conclusive evidence or a relationship.

Longitudinal research is a continuous picture of a changing human landscape with a series of snapshots, and thereby often very useful for health research. This might reveal trends and a better indicator of the effectiveness of health campaigns or interventions. Longitudinal research is obviously more expensive because of the greater number of interviews involved. Longitudinal research, as noted, might be based on the same sample over time – but with the likely problem of increasing non-response and possibly over-sensitising respondents to the topic and issues. Alternatively, longitudinal research may be based on a series of dipsticks on fresh

samples to measure changes in incidence or prevalence of a condition or situation, with sampling error a factor when comparing waves of fieldwork.

Both cross-sectional and longitudinal research can be carried out on online access panels.

Online panels versus other modes of data collection

Researchers who focus on self-reporting of lifestyle, demographics and health conditions typically use three modes of data collection: self-completion questionnaires through the post, computer assisted telephone interviewing or a questionnaire administered by an interviewer face-to-face, increasingly computer assisted. Now online access panel research presents a new opportunity and, of course, a new set of challenges, especially given the changing devices used for internet access.

Validity - how representative are the research results

Researchers who conduct surveys on attitudes and behaviours or conduct studies to test campaigns or interventions will, of course, seek to reflect truly the specific population of interest (Lamp and Hoppe 2001).

Representativeness is sometimes narrowly thought of as how representative a sample is given the sampling procedures. However, representativeness should be judged on the basis of the complete research design, not just one element. In particular, the evaluation should take into account any biases in the sampling process, non-response and, importantly, the extent the sample is likely to report their behaviour, attitudes and knowledge more honestly and reliably - freer from socially desirable responding, freer from memory distortion and without seeking views and information from others or from information sources - see Tourangeau, Rips and Rasinski (2000) for useful coverage of these topics.

How representative does the research need to be?

The simple answer is of course as representative as possible. However, higher accuracy usually requires higher investment in the research. How representative the research results need to be will depend on:

- The importance of the decisions to be based on the results;
- the types and degree of error that can be tolerated; and
- in some cases, the organisational validity of different approaches – what members of an organisation believe about the validity of different research procedures.

Government agencies and academics have tended to be risk averse and reluctant to stray from probability sampling based on large sampling frames covering ideally/nearly the whole population and the consequent comfort that sampling theory (in theory) offers in terms of statistical legitimacy and, of course, the protection it affords when scrutiny is brought to bear on the research (Williams 2012). However, increasing budgetary constraints call into question the continuing reliance on expensive large probability samples. For example, savings from using an online access panel could be used to improve other aspects of a study through, say, more extensive exploratory research, piloting, or even funding other projects. It is also interesting to note that findings from different modes of data collection, when used intelligently, are often quite similar. By intelligent use we mean where online access is not a factor, and where weighting by demographics and other factors might be

helpful. Clearly, non-probability samples must be interpreted with care. However, it is often appropriate to apply tools for statistical inference on non-probability samples as long as the assumptions are made clear and their use is indicative of relative statistical significance rather than presented as quasi conclusive. For more information, a useful guide to the pros and cons of non-probability sampling can be found within Smith's work... Is random probability sampling really much better than quota sampling? Patten Smith, Director of Survey Methods, Ipsos.

The increasing awareness of potential advantages of online panels has led to a recent upsurge in interest in their use by government and local government agencies. At UWE we have commissioned a number of projects for local government as well as the media. You may wish to note the following issues in making research design decisions.

Steps in achieving representative results

The starting point is to assess the quality of sampling frames from which a sample might be drawn in terms of its coverage, accuracy and lack of duplication of sampling units or elements.

A sampling frame can be a 'list' or file such as a medical database, the electoral register, or a telephone directory. Sampling frames will typically require sampling procedures to choose the sample, for example, Random Digital Dialling (RDD) or a geographical contact point where interviewers recruit respondents, for instance a hospital or medical centre or a high street. A number of questions arise: does the resulting sampling frame have any inherent biases as a result of certain types of people missing or if a type of person is unlikely to be found at the geographical points selected? Flipping this question over, are there individuals who might be over-represented because they are 'listed' more than once or can be found more frequently than others at a geographic point? This would increase their likelihood of being selected for research but there may be ways of correcting for this. If not, the key question is whether those over-represented or those omitted or under-represented differ in any important way to the population being surveyed. In the case of online access panels (and mail surveys) groups under-represented might include much older people with no internet access, illiterate people, and blind or partially sighted people. If so, what proportion of the population is omitted, under-represented or over-represented?

One way of overcoming over- or under- representation is to 'weight' the data, i.e. to create multipliers of the results for each group to correct the mis-proportionality of that group in the sample so that it matches the 'true' weightings of each group to the population. Weighting the data to reflect the population proportionately is typically undertaken on key demographics and, in the case of online access panels the intensity of internet use as those who use the internet more often may be overrepresented. However, do such weightings remedy the situation or simply mask a problem because those under-represented differ not just in demographics but in attitude and lifestyle? Bethlehem and Stoop (2007) have some doubts about weighting, and research on older online respondents suggests weighting may not fully correct, with offline respondents differing from those online in other ways than demographics, for instance their attitudes and behaviour (see also Couper, Kapteyn, Schonlau and Winter 2007). Weighting of the data also has implications for the effective sample size that should be used for statistical tests and inference - with the

greater the magnitude of the weighting needed, the greater the reduction in the effective sample size (known as 'neff' or effective n).

Thus, many sampling frames are imperfect. It is important to judge just how imperfect they may be, and then examine the next stage of potential imperfection, i.e. the magnitude and nature of non-response. Non response bias occurs when those who are contacted, but do not respond in some way, differ to those who do respond in terms of characteristics that are important to the survey's results.

At this point, the first assessment of representativeness should be how the combination of method of sampling and choice of sampling frame coupled with likely level and nature of non-response might affect how representative the achieved sample is likely to be. A few helpful pointers might illustrate how to approach the judgement.

Traditional face to face research may deploy a sampling frame such as the electoral register that would seem to offer near complete coverage of GB adults aged 18+; however some sectors will be disproportionately underrepresented such as some ethnic minorities, the young, students, the homeless, travellers, EU citizens and those in institutions such as care homes and those with disabilities (learning, literacy or physical). In addition, non-response through non-contact or refusals could reduce the achieved sample size dramatically of those initially randomly selected and create a biased or skewed sample that may not be easily corrected by weighting of demographics.

As regards telephone research, whilst c.86 per cent of households in Great Britain have a landline telephone researchers do meet significant barriers. Increasingly unrecognised numbers are filtered out by landline owners using either Caller Display or by answer-phones or voicemail. To members of the public screening out telephone calls in these ways one needs to add those who do answer the phone but refuse to participate in the research and those who principally use mobile phones rather than their landlines – the landlines sometimes used exclusively for broadband. How likely is it that all these non-responders are different to those who pick up the phone and participate in a study?

Researchers managing an online access panel recruit from a relatively small sampling frame of just a sample of the population of adults who have online access and agreed to join the panel. That said, online access panels, as mentioned earlier, can comprise hundreds of thousands of people. The full membership of the online panel becomes a sampling frame from which online samples are drawn. On the plus side, as briefly mentioned earlier, the drawing of samples can use probability sampling within sophisticated interlocked quotas (for instance, interlocked demographics within regions). In addition, response levels to projects can be high and it is wise to examine typical levels of response and how research agencies develop loyalty to the panel and maximum co-operation in terms of desire to respond honestly and fully. For example, one on-line supplier, YouGov, report response rates can be as high as 70-80 per cent but are usually 40-50 per cent.

Obviously, response rates may vary depending on which demographic sub-populations are of interest and how active individual panel members are.

Bethlehem and Stoop (2007) pose the question of whether online panels represent 'a paradigm theft' by which they mean an impression is often created that the traditional probability sampling paradigm applies to online panels, when in fact such

sampling is carried out on a sampling frame that may not be representative. Baker (2008) also makes the point that if true probability sampling on the whole population is not the starting point then there will be questions about how representative a panel sample is. However, we would note that that, whichever data collection method is chosen, increasingly the apparent 'gold standard' of probability sampling is increasingly difficult to achieve in reality unless enormous budgets are at a researcher's disposal. Increasing non-response combined with budget cutbacks, and hence fewer call backs on non-responders raise serious questions about how representative some of these 'gold standard' samples are in reality.

One other plus point for on-line panels is their facilitation of qualitative research. Sampling from access panels for online (virtual) group discussions can achieve in some respects greater representativeness than is the case for physical group discussions as it is not confined by geography. Additionally, for fine tuning of highly specific sub-groups, the interlocking of quotas can be very sophisticated.

Measurement and sampling modes

Some online access panels report an increase in the number of health related studies. YouGov was able to survey 150 people with atrial fibrillation. Other topics the authors are aware of being covered on online access panels include cancer, psychological health issues such as depression and self harm, osteoporosis, epilepsy and skin problems.

The very act of measurement can itself bias. For all modes, the sequencing of questions and question wordings should ideally be free from bias. However, there are potential issues that arise that are specific to modes of data collection.

Telephone or personal interviews (door to door, street/mall, place of work) can be seen by some as intrusive and make rapport more difficult which may affect the quality of co-operation and answers. However, good interviewer training can offset initial problems associated with first contact. Online access panels typically send out email invites and the survey can be taken at the respondent's own convenience and so are in that way less intrusive.

Where interviewers are present – face to face or telephone – some interviewers may inadvertently signal approval or disapproval of certain types of attitudes or behaviour. Respondents may also be more likely to give socially desirable responses (SDR) rather than what they really think or do. Obviously, online and self-completion questionnaires are less prone to such biases though do not necessarily eliminate it. To further reduce SDR online there are a number of techniques that could be considered (Nancarrow and Brace 2008). The absence of an interviewer can mean greater willingness to report accurately on sensitive topics such as sexual behaviour and problems, end of life care choices and medical conditions.

On the other hand, face to face interviewers in particular can control the interview situation better. There is greater certainty that the right person is being interviewed. It is easier to prevent respondents being influenced by others who might be nearby (family and friends) and prevent respondents looking up information to enhance their perceived knowledge. To a limited extent all of this is the case for telephone interviewing too.

If interviewers are involved the interview can be more flexible than is the case for forced choice questions online. Interviewers might accept answers that are not prescribed on a list, note these and so continue the survey. Online can be less

flexible if there are forced choice questions where respondents must select a response from a prescribed set of responses before proceeding. (Williams 2012). For instance on, say, agree-disagree scales if there is no 'don't know' option, respondents might simply click anywhere on the scale just to be able to move on, potentially creating noise or bias.

Online or a postal questionnaire mean respondents can more easily fit a questionnaire into their schedule than is the case for a face to face or a telephone interview. This being the case the quality of attention and care in completing the questionnaire interview might be higher given the respondent can work at their own pace rather than that of an interviewer. However, the presence of an interviewer can also encourage attention and care in responding.

Of course, with postal and online surveys there is a greater possibility of other people affecting a respondent's answers or responding on their behalf and of course there is also no control over respondents looking up information before answering a question.

Online access panel and telephone interviews are normally computer assisted and face to face is often so. The merits of software driven questionnaires in reducing routing errors and measurement error have been recognised (Rhodes, Bowie and Hergenrather 2002).

Finally, as far as online access panels are concerned there is the issue of panel conditioning where the behaviour, knowledge and attitudes of panel members might change because they are on a panel. Clearly, if a sample of people are recruited from an online access panel to be tracked over time then researchers need to be alert to how early interviews might trigger subsequent changes in knowledge, attitudes and behaviour. The early interview might present the respondent with knowledge or trigger greater sensitivity to or interest in a topic making the respondent more likely to notice information on a topic in the media or even seek information. The reverse of this is where panel members try to give consistent answers over time, perhaps denying any change in attitude or behaviour. Finally, there is the issue of panel mortality with respondents dropping out of a panel project. How representative are those that remain? But this is also true of panels using other modes of data collection.

An issue peculiar to online access panels where regular surveys are taken across a variety of different topics is how research competence and motivation might be affected. As regards motivation, panel members can become more or less motivated over time. If the latter and there are signs a panellist is not behaving honestly or carefully they can be identified and dropped from the panel. Panel members can also become more research savvy. This may be beneficial for the researcher. For example, the panel member understands how to use scales, projective techniques, and so on, which means he or she is less likely to make mistakes and have more time to consider responses rather than trying to understand what to do.

It is worth noting that recruitment for projects should be neutrally worded and ideally prevent second guessing of the topic, possibly camouflaging the focus initially to avoid bias in sampling.

Online access panels often have hundreds of thousands of respondents from which to sample, so fresh waves of respondents can be recruited to avoid topic conditioning. The chances of the same panellists being selected across time are

small and can be eliminated by panel management rules. However, there may be occasions where the same panel members are selected to provide greater sensitivity to change or where there is no choice when studying a minority in the population that the access panel has only a limited number of panellists for, instance, Black and Ethnic Minorities in a particular city or those with rare health problems. In such situations consideration needs to be given to how to eliminate or reduce topic related panel conditioning, for instance the frequency of interviews and time gap between interviews (Nancarrow and Cartwright 2007).

There are a number of studies that have examined various question format options open to online researchers and how these might affect results. These options include drop down response menus (Masztal and Hogg 2001) or the use of forced choice questions where the panellist cannot proceed without giving an opinion (Albaum, Wiley, Roster and Smith 2011).

Once all these issues have been considered a researcher can judge the likely impact, if any, of these various types of behaviours, both good and bad, on the results and compare and contrast the issues with other modes of data collection which will have their advantages and disadvantages.

A research project will have its own unique set of characteristics and so potential measurement error needs to be assessed each time.

Comparisons of results between modes of data collection

Dillman (2000) reported that 'Different modes of data collection often produce different results'. However, can the accuracy of online access panels be indicated by a comparison with another mode of data collection that may be considered a "gold standard? Over the decades there have been a number of studies comparing various modes of data collection. Unfortunately it seems very likely such comparisons are often very quickly out of date given the pace of change in terms of internet access, changes in technology that underpin or affect the different modes of data collection, the public's adoption of new technologies such as, in current times, smart phones, iPads and other small tablets and changes in the public's preferences for and responsiveness to different modes of research contact.

Nonetheless, comparisons of commercial research studies often show only small differences in research results when sample definitions are the same and intelligent recalibrations carried out (personal correspondence with an online access panel).

Williams (2012) explains why research for the government has a unique set of demands that explain the reluctance to move to online research, namely the need for what is regarded as high quality research that stands up to scrutiny and is inclusive (does not under-represent sub-groups). Indeed government research, particularly in areas such as health often focuses on socially excluded, poor or disadvantaged people (unlike most commercial research). Williams examined data from an online access panel with three government surveys and provided useful insights. It is quite difficult to conduct fair comparisons where, for instance, the mode might have affected other research choices (see Williams 2012 for the issue of how Don't Know responses were treated online versus face to face). It may be that, as Williams suggests, online panels are more acceptable if ballpark fixes are sought rather than very precise fixes on the prevalence of behaviours or strength of a relationship between variables.

Where there is no existing survey data on a topic collected by telephone, post or face to face interviewing then it may be useful to carry out an exploratory experiment with a key attitude, key behaviour and key lifestyle question conducted in an online access panel omnibus, a telephone omnibus and personal interviewing omnibus. An omnibus is a research vehicle offered by some research agencies on a regular basis where clients buy space on a questionnaire and so costs are relatively cheap for each party. From such an exercise a 'William's style' comparison of modes' effects can be made and exploration of how, if at all, online access panel data can be used in the future. A similar exercise might be a useful starting point for those considering migrating from one mode of data collection to another for long term trend analyses. Of course, researchers still need to take into account the potential biases associated with each mode but such an exercise may provide some reassurance.

A note on ethics and security

Research agencies offering online access panels often work to various professional bodies' codes of conduct and these should be examined to ensure all parties are treated ethically and a respondent's security is upheld (See MRS and ESOMAR codes and guidelines). Anonymity is promised to panellists to encourage honesty and if the research covers illegal behaviour such as use of marijuana for pain relief then careful thought needs to be given to how anonymity will be protected without potentially becoming an accessory to a crime.

ESOMAR also provide online 28 questions research buyers should ask when buying online samples (see references for website link).

Conclusions

Online access panels may offer epidemiologists and health researchers a very cost effective means of surveying attitudes and behaviours and assessing the effectiveness of campaigns and other interventions.

Attempts at definitive statements on the representativeness of different modes of data collection may have a short life given changes in the technology of different modes of data collection and differences between providers in terms of quality control. Comparative studies on modes of data collection can in some key respects soon be out of date because of these changes, particularly in developing countries where adoption of technology is accelerating.

All modes of data collection potentially will have biases and it is for the researcher to judge the nature of these and their likely magnitude. Whichever mode is used researchers need to be transparent about sectors that might be under- or over-represented when presenting findings. We have identified what we regard as the most relevant considerations with online access panels in mind. There will typically be, sometimes difficult, trade-offs of potential errors. The ultimate aim must be that the research results represent the population with sufficient accuracy given the decisions to be based on it and that the research is cost effective. The other factor is that of 'organisational acceptability' – the perceived validity of different modes of data collection. Encouragingly, some GB and local government agencies are experimenting with mixed modes of data collection including online and so show signs of adopting the new mode. Organisations should regularly review the validity of different modes of data collection and, if relevant, consider how best to switch modes for a continuous survey without losing trend.

Van Gelder, Bredveld and Roeleveld (2010) comment “... *web-based questionnaires could be considered an alternative or complementary mode in the range of epidemiologic methods of data collection*”.

If time allows, we would recommend experimenting with different modes of data collection. For instance, as mentioned above, one might ask a key behavioural question, a key attitude question and a key lifestyle question across different modes. There are cost effective omnibus research services using telephone and personal interviewing and, of course, research suppliers for online access panels. Running key questions across different modes of data collection would provide the opportunity to compare and contrast results from those with internet access across different modes of data collection. It might be that weighting on a key variable to bring results (sufficiently) into line. It may also be worth considering mixed methods of data collection where this improves coverage of a population but thought will need to be given to how to minimise potential biases associated with different questionnaire and question formats.

Finally, online access panels may mean research in many health care areas is now affordable and can provide good information to replace speculation.

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