

Strengths and Weakness of Online Surveys

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Abstract: Data is of paramount importance for research. Though the methodology for research studies may vary, every research is based on data which should be of good quality and which is then analysed and interpreted to yield information. The commonest among several methods of primary data collection are surveys and they can be grossly categorized into two groups. viz., manual and electronic. Three major methods of collecting survey data electronically are computer administered surveys, electronic mail surveys, and web surveys. The technology for online survey research is young and evolving. Yet many researchers in different disciplines may be unaware of the advantages and disadvantages associated with conducting survey research online such as in public health discipline. Creating questionnaire, contacting the sample population, storing the responses, visualization of survey results can be done in online. Online surveys are useful in questionnaire preparation, data collection, storing of data, visualization of data and for collaboration of work. Online surveys can be conducted at low cost and in a short period of time. Researcher can start the survey, able to pause the survey and restart the survey whenever he wants. Several other studies also stated that online surveys are cost effective studies and can be conducted in a short period of time. The challenges relate to online surveys are the sampling, response rate, non respondent characteristics, maintenance of confidentiality, and ethical issues. Concluding that, online survey tool is an internet based survey tool with advantages and disadvantages in every stage of survey. Researcher had to decide to use the online survey tool based on his own study setting, study population and methodology of the study.

Keywords: Computer administered surveys, Email based surveys , Online surveys, Survey tools, Web surveys

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I. INTRODUCTION

Data is of paramount importance for research. Though the methodology for research studies may vary, every research is based on data which should be of good quality and which is then analyzed and interpreted to yield information. Research is predominantly based on primary data. The commonest among several methods of primary data collection are surveys. With the application of probability sampling in the 1930s, surveys became a standard tool for empirical research in social sciences, marketing, and official statistics (1). According to Oxford dictionary, survey is an investigation of the opinions or experience of a group of people, based on a series of questions (2). Questions used in the survey are generally a set of predetermined questions, mainly aimed at extracting specific data from a particular group of people regarding their preferences, opinions, behaviour, or factual information, depending on survey purpose. Surveys can be specific and limited, or they can have more global, widespread goals. Psychologists and sociologists often use surveys to analyse behaviour, while it is also used to meet the more pragmatic needs of the media, such as, in evaluating political candidates, public health officials, professional organizations, and advertising and marketing directors (3).

A single survey is made of at least a sample population, a method of data collection, survey tool with individual questions that become data and that can be analysed statistically (3). The success of the research depends on sample of the population and the representativeness of the sample with respect to a target population of interest(3). Data collection methods can be grossly categorized into two groups. viz., manual and electronic. In the health sector, data can be collected electronically through electronic health records and contributes to the pool of secondary data. They provide several advantages over paper based ones as data is readily available for analysis such as data mining (4). Survey have however primarily depended on paper based methods using techniques of household visits, face to face conversations, interviews, distributing questionnaires, filling of schedules under direct supervision etc. The challenge is to transform the paper data to electronic form for

processing and analysis. Even when data is available electronically often it is reduced to paper format before the process of data capturing. This is inefficient and expensive and results in poorer data (5).

The tedious process of data entry can be simplified by using Optical Character Recognition (OCR) and Intelligent character Recognition (ICR), however, these can be used only where the survey responses are standardised. With the wide availability of computer systems and internet connectivity online electronic collection of data has several advantages. However there are several disadvantages too. Three major methods of collecting survey data electronically are computer administered surveys, electronic mail surveys, and web surveys (6,7).

The technology for online survey research is young and evolving. Until recently, creating and conducting an online survey was a time-consuming task requiring familiarity with web authoring programs, HTML code, and scripting programs (8). But, Survey authoring software packages and online survey services make online survey research much easier and faster. Yet many researchers in different disciplines may be unaware of the advantages and disadvantages associated with conducting survey research online such as in public health discipline. The scope of surveys in public health field is very wide. Surveys in public health are of different types, surveys for evaluating health status of a population, surveys for investigating the factors affecting health and disease, surveys relating to administration of health surveys. Simple patient satisfaction surveys to National level Family health surveys, epidemic surveys in a village to morbidity and mortality surveys are different examples of public health surveys. Sample population size, targeted population, questions in the survey form may vary from survey to survey depending on the purpose of the conducting survey. The data collection procedure is mainly off-line type such as Household visits, face to face conversations, direct observation etc. But because of advancement in the science and technology particularly in the communication field, data collection procedure in survey is also changed. Usage of online survey tools gradually started in public health also.

Creating questionnaire, contacting the sample population, storing the responses, visualization of survey results can be done in online. Some survey tools such as Epidata, Epicollect and Epiinfo are providing facilities to distribute the survey form to several data collectors, real time entry of data in the software and having integration of work done by different data collectors (9–11). They are also providing the facility to store the geo-location data such as longitude and latitude details. They had integration with mobile technology and the application can be saved as an app in android based or IOS based cell phones. In spite of advancement in the online survey data collection methods, many public health experts are still unaware of strengths and weaknesses of online data collection. With this background this paper discusses the advantages and disadvantage of electronic data collection in general and web based method in particular.

Computer Administered Surveys : With the growth of personal computers and computer networks Computer administered surveys were the real first use of computers in collecting survey data. Using a written programme to administer the questions and collect the answers, the survey could be conducted in one of several ways: 1) by gathering respondents to central location to answer the questions at the computer; 2) the survey installed on the organization's network; or 3) the program saved on a disk for respondents to answer and then return the disk (12).

The initial literature compared the data and response quality between computer administered surveys and paper based counterpart. Overall, the computer administered survey showed comparable results to the traditional paper and pencil survey (13–15)

However, electronic surveys were less socially desirable and more extreme (16). Responses to open ended questions were relatively long and disclosing. No differences were found between the effect of computer administered surveys, face to face administration, and self-administered paper and pencil surveys on an individual's accurate expression of sensitive information. Though computer administration did not increase accurate response, respondents rated the computer as less friendly, faster, more relaxing, lighter, and more interesting than the other two methods. Better educated individuals and defensive clients did not like using the computer for the survey (17).

Overall the benefits to computer administered surveys to be 1) lowered levels of social desirability responding; 2) shorter and more to respondents 3) elimination of data entry and 4) use of complex branching and prompting of question (12). Further computer administered surveys showed fewer mistakes, fewer blank items, and fewer item refusals than paper surveys. There was a decrease in processing costs while still allowing standardization and anonymity (16,18). Further, authors have found disadvantages to computer based surveys. These are 1) expensive for small numbers of people (14) 2) incompatibility of software across systems (19); 3) discomfort in using computers for non-office workers (14) 4) people want a way to know how much time is left (19) and 5) resentment to being surveyed in a nonsocial manner (17,20). Computer administered surveys are most appropriate for organizational settings that allow for 1) a group of

people to gather in a central location to answer the questions, or 2) a compatible network of computers to administer the questionnaire.

Electronic Mail Surveys: With email becoming ubiquitous, electronic mail surveys became popular. The survey is sent to a person's email address. The respondents could answer the questions and mail back the responses to the researcher or print the questionnaire fax the responses. Both sending and responding became simplified and cost effective (12). Other benefits were increase in geographical spread of respondents, speed of response- responses can begin immediately; and elimination of time zone hassles for individuals in different geographic areas (21,22). The disadvantages were, data entry was still required and compatibility of software. The biggest disadvantage was many people do not have email, may prefer not to use it, or may be unfamiliar with some of the more advanced functions that may be necessary in answering a questionnaire on line. Individuals may delete or not respond to email that fails to interest them. Studies have found questionnaire length to be an issue as many programs restrict the number of lines in a message and respondents will not answer lengthy questionnaires via email. Krasilovsky, 1996 (23) found that respondents may disregard questionnaire design and rewrite questions, delete questions, and extend scales. Net etiquette ('netiquette') frowns upon mass electronic mailings. Email software restricts the number of addresses to which a mail can be sent simultaneously. Over time response rates dropped as consumers (respondents) grew overwhelmed with surveys popping unwelcomed into their inboxes. Companies had to find a way to improve response rates. Survey sites were born, helping match companies to consumers who wanted to share their opinions (24).

The web survey: To a survey taker, a survey may seem like a simple progression of questions. However, while some surveys can be as short as a single question, others can be complex webs of blocks of questions and conditions that sometimes would include scripting (25). Modern online survey tools include three main components questionnaire design, distribution and reporting. Simple Polls are already built into Facebook and Twitter. Google Forms is ideal for sending out a short questionnaire, charting the results or exporting them for analysis to a spreadsheet. It provides for a variety of questions formats from Text boxes, Paragraph texts, Multiple choice, check boxes, scale, grid etc. It permits custom logic to navigate through questions based on answers. In built data validation rules ensure that people get the right questions based on the previous answers.

There are several online survey tools for more complex designs for novice and advanced users. Many include display logic, which is the ability to show or hide a question or section of a survey based on conditions that occurred before it. Other features include survey reminders, timers, question blocks kiosk based response etc. PC magazine offers an excellent comparison of the top survey tools (25) Often however data collection has to be done in challenging environments with limited or no internet connectivity and power supply. The situation becomes even more challenging during humanitarian crisis – natural disasters, civil strife, wars etc. The challenge is to collect data offline using small devices using multiple personnel in the field to be merged later to a single database. KoBo Tool box developed by the Harvard Humanitarian Initiative is an open source suite of tools for data collection and analysis to bridge this gap (26). Data can be collected in using Android Phones and other hand held devices. Epiinfo and Epicollect offer similar features. A review of 10 softwares is available at Zapier.com (27).

While email and online survey have the same advantages and disadvantages as computer based data collection a few additional challenges are thrown up. The challenges relate to the sampling, response rate, non respondent characteristics, maintenance of confidentiality, and ethical issues.

Suitability for different study types: Online survey technique is suitable for descriptive, case control, cohort studies and evaluation studies. Online survey technique is suitable to collect information in cross sectional study in which researcher will contact participant only once and longitudinal studies in which the researcher should contact the participant more number of times. Web based data collection procedure is useful in cross sectional studies and case control studies. The researcher can limit the multiple submissions by enabling cookies in the survey tool. Email based data collection procedure is useful in longitudinal studies and cohort studies. Researcher can send the timely reminders to the participant till he gets the response. Online surveys are not suited for experimental studies where direct observations or measurements have to be recorded. In Experimental studies, software packages such as Epi-info, Epi-collect are useful. The investigator can enter the details directly in the software package in which the data will be stored electronically. The chief investigator can integrate the work done by different investigators in different locations. But it needs awareness about online technology in the investigators.

Selection of sample population: Probability sampling has been the dominant paradigm for surveys for many decades, but it has by no means been the only paradigm nor has it always been dominant. The principal goal of survey sampling is to make reliable and accurate inferences to a broader population often referred to as “

representation“ (28). Commonly used study designs in health research are case-control studies, clinical trials, evaluation research designs, and intercept surveys are non probability sampling methods. With the advantages of becoming web based, surveys have become non probabilistic because of state that biases may occur in web surveys due to self-selection, under-coverage, non-response, and sampling errors. Weighting is used to adjust survey statistics for unequal selection probabilities, coverage error, or to represent population characteristics on several covariates (29).

In the web based surveys, researcher cannot ensure sample population is mainly from targeted population. Anyone can open the link and fill the form. Kevin B. Wright also stated the advantage and disadvantages of online research are sampling issues are access to unique population and selection bias of selecting study sample (7). Bobby Duffy and Kate Smith mentioned the same advantages in his study (30,31).

Ethical Issues of Online Survey - Informed Consent form: A basic standard of ethical research is that prospective participants are able to make informed choices about whether or not to consent to participate. To ensure potential participants are as fully informed in online survey research as in other types of research (32). Study conducted by Elizabeth A. Buchanan, Erin E. Hvizdak also mentioned that “Respondents indicated that the electronic and online nature of these survey data challenges traditional research ethics principles such as consent, risk, privacy, anonymity, confidentiality, and autonomy, and adds new methodological complexities surrounding data storage, security, sampling, and survey design” (33). Connie K. Varnhagen , et al., also stated in their study concluded that obtaining informed consent online is not substantially different than obtaining it via paper presentation (34).

As a basic requirement of ethical research the researcher should take consent from the participant before taking their opinions. The consent form should be a separate form and it should not be combined with main questionnaire. Mahon (2013) recommends setting an information sheet as the first page of the online survey, with participants required to check a box to indicate consent before accessing the survey. This ensures that participants have access to the same information they would receive prior to completing an offline survey (35).

Page logic option is useful to lead the participant to the main questionnaire. IP address of the participant will act as a data key to link the consent form and data filled by the participants. However, the internet assigns a dynamic IP address to each user for each session. If participant fills the consent form and the data form in different sittings, then linking the consent form and data filled by the participant may not be possible. Participants may by pass the information page. To preempt this referrer verification can be set up allowing access to the survey only when it come from a particular URL. Valerie M. Sue, Lois A. Ritter in their book *Conducting Online Surveys* mentioned the same procedure to take informed consent from the participants of online survey (31).

Privacy, anonymity, and confidentiality are key ethical considerations in online survey research. Although often considered in tandem, it is important to differentiate anonymity and confidentiality. Anonymity is the process of not disclosing the identity of a research participant, or the author of a particular view or opinion. Confidentiality is the process of not disclosing to other parties opinions or information gathered in the research process (36) The increasing functionality of survey tools can potentially undermine both anonymity and confidentiality.

Andrew Clark (2006) states three broad reasons for anonymizing data, the first to ‘protect’ or hide the identity of research participants, second to disguise the identification of research locations and third to comply with legal requirements on privacy. The first is particularly important when sensitive, illegal, or confidential information may have been disclosed during the research process, or when information is disclosed which may cause the participant distress should other parties learn such information (36).

IP addresses should be stripped from the dataset, preferably before saving the data file to the researcher’s computer (37,38) Unique tracking links in online surveys also undermine anonymity through providing a link between survey responses and the email address of the survey respondent. These too should be stripped from the data set. Clark discuss further techniques of anonymizing data such as ‘blanket anonymization’ and the pros and cons of anonymizing data. Direct and, Indirect identifiers need to be anonymized. Several techniques have been described to anonymize data (39–41).

For public health geo referenced data is of particular importance for epidemiological analysis including spatial analysis. Point coordinates may be replaced with non-disclosing features or variables - polygon features (km² grid, postcode district, county), or linear features (random line, road, river). Alternately the geo-references can be maintained intact and access restrictions imposed on the data(40).

Questionnaire preparation: Online survey technique changed the individual questions in the survey tool. Traditional questionnaire will contain only open ended or structured questionnaires with multiple choice options. But, various online survey tools providing different options to create a complex questionnaire. These

tools also enable us to create automated data for example Date and time of filling questionnaire, geo-spatial location details of participant, IP address from which the participant is filling form. Some survey tools such as SurveyMonkey.com will give suggestions in preparing the questions (42). Google forms has so many add-ons for integration with other survey tools (43). Researcher can prepare a more complex form by using Yes/No options, Radio buttons, matrix of radio buttons, drop down menus, matrix of drop down menus and even can conduct opinion poll. Some survey tools also provide page logic options and question logic options. Based on the answer to the previous question, they will display the next question or forward to next page. Progress bar is another feature to display the progress of questionnaire filling. Some survey tools will use cookies to stop multiple submissions from the same IP addresses. Weakness in online survey in questionnaire preparation is the researcher cannot probe the participant to get answers and can ask leading questions.

Data collection: Even though, as stated earlier, an online survey may yield a non probabilistic sample, a researcher can get diverse participants. Professional groups are available in many websites such as LinkedIn, Researchgate, Whatsapp groups. Sample population having expertise in one specific field can be obtained from these groups. Kevin B. Wright also stated the main advantages of online research are access to unique population, saving the time and conducting research at low cost (7). There are some disadvantages also associated with online survey method. Distribution of survey link is easy and sometimes it will become viral. Researcher cannot determine questionnaire filling time and may abandon the survey giving partial data. Participant can take his own time to fill form. It may create bias. It is difficult to explain in detail about study objectives. If the participants have a doubt, researcher cannot immediately clear it immediately. Potential Spamming by participants could be another disadvantage. A participant repeatedly submitting the same opinion, it may alter the results and create bias. The software do have work around for this by restricting respondents to one response.

A major issue of online survey is the participation rate. Generally response rates are very poor compared to off-line survey method. In our experience in our survey yielded a poor response rate. The survey form was distributed in different plat form such as Whatsapp groups, LinkedIn contacts and also mailed the form to number of public health experts and received only 74 submissions. Among the 74 total opinions, 14 were duplicate entries and 60 were original entries by public health experts. Among the 60 participants, 34 participants gave their opinion and 26 participants are non-willing persons to gave their opinion. A study conducted by Abhijit Boratne, had a response rate of 50% among 76 participants. Only 40% had submitted completed forms. In a survey of 10000 anesthetist only 17 % responded. A comparison of various survey methods showed an average response rate for all methods to be 33%. In-Person surveys had the highest rates of 50%. Email surveys had 30%, online surveys 29% and in-app surveys 13% (44). Roberts and Allen summarize the reasons for poor response as faculty email addresses when emails are the primary mode of recruitment, irregular or non access of emails by potential participants, emails being filtered to spam folder and survey fatigue, a phenomenon common to all surveys (32). They further state "In combination, these factors may reduce the response rate to the survey and potentially bias results if unreachable participants systematically vary from those who do receive and read the recruitment email". To account for this bias researchers recommend that a percentage of non-respondents be contacted, profiled and reasons for non response elicited.

The second component of survey non-response is where participants choose not to answer some questions on a survey. Internet survey researchers can enable "forced responding", where a participant cannot move on to a further question until an answer to the current question has been provided. While this has advantages for the researcher in terms of eliminating missing data it does raise ethical concerns. Baker (2012) reported that three quarters of the 52 IRBs surveyed viewed forced responding as violating research participants' rights not to answer individual questions [29]

Reliability of the opinion expressed by the participant is another issue. Online survey participants choose mid points in the scale while filling the forms. The same opinion expressed by Bobby Duffy and Kate Smith in their study [32]. Researcher cannot judge the participants seriousness about the questionnaire while expressing an opinion. The main disadvantage of the online survey method is missing out of knowledgeable participants lacking computing and internet skills. The small screen size of mobile phone limits the length of the questionnaire and the responses for open ended questions.

Storing of Data: Collected data should be stored in a proper way for statistical analysis. Online survey technique is useful to store data in online after submitting the filled in form. Real time storing of data is automatic procedure in online survey technique. The data will be stored in central server of website and researcher can download the data from the server. Main threat for online storing of data is crash of data in servers because of server issues or hacking of the websites. The solution for this threat is to download the data

regularly and storing it in personal computer. Online data storing has an extra advantage i.e stored data is not accessible for others, thus it will be free from data editing.

Visualization of data: Online survey tools will show the data in the form of different charts and graphs. It is very easy to plot the graph in between different variables. Bobby Duffy and Kate Smith also stated that online survey tools are flexible to visualize the data (7,30). But the main disadvantage is the survey tools will have only some prefixed models. Analysis of data is not possible in online tools. But this deficiency can be overcome by using software packages such as Epi-info, Epi-data or Epi-Collect.

Collaboration of research: Online survey technique is useful for multi-centric studies. Two collaborators from different areas can share the work, share the data and results. But the disadvantage in sharing the project is, two researchers can modify the questionnaire without the knowledge of another researcher. It can be controlled by regular communication between collaborators. Sharing data and results may arise privacy issues of study participants. There may be a threat of data leak and security of data is another problem when multiple researchers are involved.

Other advantages: Online surveys can be conducted at low cost and in a short period of time. Researchers can start the survey, able to pause the survey and restart the survey whenever they want. Several other studies also stated that online surveys are cost-effective studies and can be conducted in a short period of time.

II. CONCLUSION

Online survey tool is an internet-based survey tool with advantages and disadvantages in every stage of survey. Researchers had to decide to use the online survey tool based on their own study setting, study population and methodology of the study.

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