

A COMPARATIVE ANALYSIS OF MAIL AND INTERNET SURVEYS

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Abstract.—The field of survey research is constantly evolving with the introduction of new technologies. Each new mini-revolution brings criticism about the accuracy of the new survey method. The latest development in the survey research field has been increased reliance on Internet surveys. This paper compares data collected through a mixed-mode (mail and Internet) survey of Zuma Beach users in Malibu, CA, focusing on differences in response rate and in responses to questions between the two modes. Two-sample *t*-tests were performed on each variable to determine differences between the modes. These tests found 15 significant differences in responses to demographic variables, scale items, and Likert items. The format of questions is discussed as a possible explanation for some of these differences in responses.

1.0 INTRODUCTION

The widespread availability of the Internet and the rapid pace at which online technologies develop has led to a rise in Internet-based social research, mainly in the form of electronic surveys. Ease of use, low cost, and advanced capabilities make Internet surveys an attractive medium to many researchers. Internet surveys also have some potential limitations. Two of the most often criticized (and studied) aspects of Internet surveys are lower response rates than mail surveys, which could indicate a nonresponse bias (Manfreda et al. 2002), and real or potential differences between data collected online and data from mail-based surveys.

To examine these two possible limitations, a mixed-mode survey method was used during a recent research project at Zuma Beach in Malibu, CA. The primary goal of this project was to pilot-test questions about social benefits

of coastal restoration. In addition, the response rates and likeness of data collected between mail and Internet versions of the survey were analyzed.

2.0 METHODS

Data were collected through a survey sent to individuals who used Zuma Beach during summer 2008. The researchers followed a sampling schedule which randomized the time of day, day of the week, and area of the beach from which they drew their sample. Potential participants were first asked to participate in a research project about beach use. If they agreed to participate, they were asked to provide their name as well as either a mailing address or an email address; those who provided both were randomly assigned to one of the groups.

During field-sampling, 1,416 people provided useable contact information. Two-thirds of the sample (949 individuals) subsequently received the mail version of the questionnaire and the remaining one-third (467 individuals) received the Internet version.

The mail version of the questionnaire was distributed using the Dillman Total Design Method (Dillman 1978). The Internet version of the survey was distributed using a similar design (Dillman 2000). Individuals in the Internet group received four email contacts from the researchers, consistent with the traditional Dillman Total Design Method. However, the day of the week on which a participant received the email notifications was varied to account for individuals who check their email at different frequencies.

3.0 RESULTS

3.1 Modal Response Rates

The research sought to determine whether response rates between the two modes were different. Prior research in this field has implied that mail-based surveys have higher response rates than their online counterparts (Smee and Brennan 2000, Fricker and Schonlau 2002, Kaplowitz et al. 2004). The response rates in this research are 50

Table 1.—Modal response rates

	Initial Sample	Non-Deliverable	Effective Sample	Completed Surveys	Response Rate
Mail version	949	66	883	441	50%
Internet version	467	71	396	173	44%

Table 2.—Demographic profile of the average respondent, by mode

	Mail Respondents	Internet Respondents
Gender	Female	Female
Age	41* years	45* years
Racial category	White	White
Annual income	\$75,000 - \$99,000*	\$100,000 - \$124,999*
Level of education	Bachelor's degree	Bachelor's degree
Children living at home	Yes	Yes

*Significantly different at the $\alpha = 0.10$ level.

percent for the mail version and 44 percent for the Internet version (Table 1). It is important to note that these two rates are not statistically different ($p=0.21$).

3.2 Differences in Responses

The analysis also examined differences between the actual responses that participants provided. Differences between mail and Internet groups were tested using a two-sample *t*-test performed on all 144 variables. Using an α -level of 0.10, we expected to observe 14 significant differences between responses. An α -level of 0.10 is used instead of the conventional 0.05 because it is a more powerful statistical test, though less rigorous (Trochim 2000, Gigerenzer 2004). In this type of social research, this α -level is sufficient for drawing statistically significant conclusions.

Fifteen significant differences occurred between the sets of data in demographic profile information and responses to scale and Likert items.

3.2.1 Respondent demographic differences

The two groups of respondents were virtually identical in demographics (Table 2). Cole (2005) suggests that mail survey respondents are likely to be older than online survey respondents. In this research project, however, online survey respondents were significantly older (mean age = 45 years) than mail survey respondents (mean age = 41 years). The two respondent groups differ significantly in income level; Internet survey respondents have a

higher average income than mail survey respondents. This income difference may reflect different levels of Internet access and/or proficiency between the two groups.

3.2.2 Response differences on scale items

Three of the 15 significant differences in the data were in questionnaire items, where the participant was asked to assess the level of a variable (e.g., familiarity, crowding) on a 9-point scale. In the mail version, participants were instructed to circle a number on a number line to identify their level of a variable (Fig. 1A). The Internet version required that respondents click an un-numbered radio button to indicate their level of a variable (Fig. 1B).

Online survey respondents consistently rated variables lower on these Discrete Visual Analog Scale (DVAS) items than did mail respondents. DVASs may be more ambiguous than their Likert-type cousins because they lack labels for each point on the scale (Uebersax 2006). The presence of a number in the paper version may have helped respondents “anchor” their response to the question by associating their level of a variable with an actual number. Because there was no numerical label for each radio button, Internet participants could rely only on the verbal descriptions at the poles of the scale as a basis for their ratings. In essence, online survey respondents lacked the advantage of having each possible rating “explained” by a numerical label as the mail respondents did.

A **25. On the scale below, please indicate how familiar you are with the restored Zuma Creek area at Zuma Beach. (Please circle one response)**

1	2	3	4	5	6	7	8	9
Not at all								Extremely
familiar								familiar

B **25. On the scale below, please indicate how familiar you are with the restored Zuma Creek area at Zuma Beach.**

	Not at all							Extremely
	familiar							familiar
Familiarity	☐	☐	☐	☐	☐	☐	☐	☐

Figure 1.—(A) 9-point scale item from the mail questionnaire. (B) 9-point scale item from the Internet questionnaire.

This potential Format-Associated Response Effect needs further examination. If, in fact, participants do use the numerical descriptions to anchor their responses on the scale, researchers using online survey software need to be aware of this issue.

3.2.3 Response differences on Likert-scale items

The remaining 10 significant differences observed between the two modes were on Likert-scale items. These differences did not have the same pattern as the differences on scale items and were seemingly random throughout the questionnaire. Further, we might have expected to observe differences on Likert-scale items as opposed to multiple-choice or open-ended items, simply because there are more Likert-scale items on the questionnaire.

4.0 DISCUSSION AND IMPLICATIONS

As technology develops and Internet use spreads, online surveys will likely begin to replace mail surveys. However, some researchers are uncertain about whether Internet surveys will produce the same result as mail surveys. This research found that the information is almost the same between the two modes; the major differences between the two modes were on scale items. Since response rates between the two modes were statistically the same, people seemed equally comfortable filling out online and hard-copy surveys. More research is needed on the potential effects of question-and-answer formatting on Internet versus pencil-and-paper surveys.

5.0 CITATIONS

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