

Obtaining Responses by Mail or Web: Response Rates and Data Consequences

Glenn D. Israel
University of Florida

Abstract

Development of new technologies have complicated the survey process and increased opportunities for individuals to decide when and how to respond. This study explores the willingness of people who have obtained information from Cooperative Extension, a quasi-general public population, to respond to a customer satisfaction survey via the Web. Extension clients were sampled and randomly assigned to three treatments. Results show that Web-preference respondents (who could respond by Web initially or by mail later) had a lower response rate (52.6%) than did mail/Web choice and mail-only respondents (59.2% and 64.5%, respectively). A larger proportion of Web respondents had at least some college education and were under 65 years of age. Perceptions of service quality by varied somewhat by response mode with more Web respondents being "very satisfied." Given that survey mode resulted differences in the demographic profile and substantive results, this suggests researchers should consider how their results might be affected by methodological decisions about using the Internet or mixed-mode surveys.

Key Words: Response rate, Internet, mode effects, Extension, satisfaction

1. Introduction

These are turbulent times for researchers who wish to conduct surveys to identify citizens' opinions about, needs for, participation in or outcomes from public and private sector programs and services. The development of the Internet as a means for conducting surveys has sparked considerable interest in exploring alternatives for collecting data. This is especially true for those facing declining response rates and increasing costs for conducting telephone surveys (see Curtin, Presser & Singer 2005). Continued development of new technologies, especially with regard to the Internet and cell phones, have complicated the process of contacting clients and increased opportunities for individuals to decide when and how to respond to survey requests (Dillman, Smyth & Christian 2009). The variety of Web browsers and hardware configurations, as well as the evolving Internet environment (including threats from viruses, worms and other malware, as well as those from phishing and scams aimed at identity theft) impact people's access to the Internet and their willingness to respond to surveys. Similarly, cell phones have increased access to specific individuals but made it more difficult to select random samples that can be used to represent the needs or interests of specific population groups. Moreover, norms for answering telephone calls are changing with the advent of caller id, telemarketing and technological changes, such that calls to participate in a telephone survey are less likely to engender cooperation (Dillman et al. 2009).

On the other hand, Web-based and mixed-mode surveys offer alternatives to telephone and mail surveys, but the consequences of employing these alternatives are not fully understood. Many survey professionals hope that Web surveys can be used as an easy, low-cost method for collecting data. The utility of the Web has been demonstrated for populations with nearly universal coverage, such as university students, faculty and selected professional groups, but response rates and respondent profiles can differ

between Web and mail survey respondents (Fraze, Hardin et al. 2003; Kaplowitz, Hadlock & Levine 2004; Kwak & Radler 2002; McCabe, Couper et al. 2006). A number of surveys also have been developed in conjunction with evaluating educational information on the Web (Couper 2000) but there is little control over who responds and, consequently it significantly weakens the credibility of findings. Other approaches, such as opt-in panels, have unknown biases and strategies for weighting the data might not result in representative findings (Couper 2000; Bandilla, Bosnjak & Altdorfer 2003). Despite the enthusiasm for Web surveys, it is important to assess the utility of Internet surveys across a variety of populations and topics in order to develop a better understanding of when and how Web surveys should be implemented.

Some of the recent research on using the Internet has focused on the use of the Postal Service's Delivery Sequence File (Dillman et al. 2009; Smyth, Dillman, Christian & O'Neill 2009; Miller, Kobayashi et al. 2002), which contains addresses for nearly every household in the United States, as a sampling frame for surveys of the general public. While the results from these studies suggest that the general public can be surveyed using a mixture of mail and Web, the utility of the Web for surveys of similar quasi-general public populations, such as land grant universities' extension clients, where there is usually a list of names and addresses needs to be demonstrated.

This study explores the willingness of a broad spectrum of clients who have obtained information from Cooperative Extension *and* for whom no email address is available to respond to a customer satisfaction survey via the Web. Specifically, the research questions to be addressed are:

1. To what extent will Extension clients respond to a survey via the Web?
2. How does the quality of data differ between Internet and mail responses?
3. Do clients who use the Web differ from those responding by mail?
4. Are there substantively important differences in customer satisfaction?

2. Background

In order for land grant universities' Cooperative Extension Service to develop effective non-formal educational programs for the public, faculty conduct surveys to collect data on needs for program development or on program participation, satisfaction, and outcomes for program evaluation. Selecting a mode – drop-off/pick-up, telephone, mail, Web or mixture of modes, for a survey is an important decision. Because of resource constraints, extension professionals often choose group administration (typically during a seminar or workshop) or mail administration. Although there are exceptions (e.g., Terry & Israel 2004), telephones are seldom used by extension professional because the required labor for making a large number calls is not available without external funding.

In the case of needs assessment surveys for program development, lists of extension clients might provide incomplete coverage – undercoverage from potential clients missing from the list and overcoverage from collaborators and other extension staff who are included in the list. Although evaluation studies usually focus on program participants and can utilize registration lists for the frame, there is the problem of contacting nonparticipants for the more rigorous evaluation designs that involve a comparison group. Research by Dillman et al. (2009) and Link et al. (2008) suggests that the Postal Service's Delivery Sequence File (DSF) can be a useful sampling frame for surveys of broad clientele groups to reduce coverage problems. Coverage of specialized groups, such as small farm operators, remains problematic.

Whether people will use the Internet to respond to surveys is influenced by a number of factors, not the least of these is access to the Web. As of December, 2008, 75 percent of American adults use the Internet (Pew Internet & American Life Project 2009). Data from the Pew Internet & American Life Project (2009) also show:

- Persons with a college education were more likely to have Internet access (95%) than those with only a high school diploma (67%) or less than a diploma (35%).
- Older Americans are less likely to use the Internet (41% of those 65 or older) while the percentage increases for persons 50-64 years of age (72%), 82% for those 30-49 and 87% for 18-29 years old.
- Hispanics (58%) and Black, non-Hispanics (64%) are less likely to use the Internet than White, non-Hispanics (77%).
- Rural residents, including many farm families, have lower rates of using the Internet (63%) than do urban (71%) and suburban residents (74%).

While a large majority of adults have access to the Internet, just over half (55%) have a broadband connection in 2008 (Horrihan 2008). This is significant because Web pages for surveys take more time to display and transmit information with a slow connection and this, in turn, increases the psychological cost of responding. People with lower educational attainment, minorities, elders and rural residents also are less likely to have a broadband connection (Horrihan 2008). These data suggest that some segments of Extension's clientele have much better access to a survey on the Internet than do others.

Given that the coverage of the Internet is incomplete and uneven, the DSF is an important option for another reason. That is, there is no readily available list of email addresses. For those that do exist, there can be problems with overcoverage (some people have multiple email accounts and hence have a greater probability of being selected) and undercoverage (some people have email accounts but the address is not included in the particular list).

In addition to access issues, other factors that might affect the propensity of clients to respond to a survey via the Internet (when a request is sent by mail) include ready access to a computer when the mail is opened (that is, is the system booted up and ready for use) and available time to complete the survey "now," providing an easy-to-type url to access the survey, having experience with using Internet forms from shopping, on-line banking, or previous surveys, and deriving psychological benefits from responding quickly and participating in the survey. Having experience using the Internet might increase preference for this mode (Dillman 2009) and reduce psychological cost, the latter because experience creates cognitive fluency (Schwarz, Bless, Wänke and Winkielman 2003). Dillman (2009) also suggests that providing a choice to respond by mail or the Internet increases the complexity of the response decision and this can raise the cost, resulting in reduced response rates. Given this set of factors, it is not surprising that the attributes of people who responded via the Web were found to be different in a number of ways from those who responded by mail (Smyth et al. 2009).

Finally, whether the Internet is an appropriate mode rests on the nature of researcher's relationship with the intended recipients of the survey. In the case of an evaluation survey targeting clients who participated in an Extension program and who have provided their email address, there is a clear prior relationship. When there is a prior relationship it is considered appropriate to initiate a request to complete a survey using the Internet (Council of American Survey Research Organizations, no date:8). This is because the Internet is not considered a public utility in the same way that postal addresses are served

by the U.S. Postal Service (Dillman et al 2009). But in the case of assets and needs assessment surveys or an evaluation survey that includes nonparticipants, people who receive the survey might not have had contact with extension before. An invitation to participate in the survey should be conveyed through the mail or by telephone in order to conform to ethical standards for conducting surveys.

With this background, I expect that an invitation to respond to a survey on the Internet will result in a lower response rate than one by mail, primarily because some clients do not have access to the Internet. There is also evidence that when the invitation to respond via the Web includes an offer for a paper copy, respondents who prefer paper will wait for the mailed version (Schonlau, Asch & Du 2003; Smyth et al. 2009). Clients who are offered a choice also will opt for the mail version more often because it is readily accessible and most people have experience completing paper and pencil surveys. Because of the complexity argument by Dillman (2009), I expect the fewer clients who are presented a choice will respond as compared to the traditional mail survey.

3. Methods

The study used data collected for the annual survey of Florida Cooperative Extension's (FCES) customers in 2008. FCES provides an array of educational programs, including homeowner landscape maintenance, parenting and financial management, youth development, and agricultural production classes. The survey was sent to a sample of clients who were selected from the population that had attended a workshop or seminar, called the Extension office, or visited the office in order to solicit feedback about their experiences. The survey included questions on: overall customer satisfaction with the services provided by Extension, clientele's satisfaction on four dimensions of quality, outcomes of the use of Extension service, and demographic attributes of the respondents. The customer satisfaction survey has been conducted annually since 1997 using telephone (1997-2004) and mail (2003-2008) modes.

For the 2008 survey, a random sample of 1,402 was selected from lists of extension clients in 14 of Florida's 67 counties (based on a 5-year rotation). The list of clients were obtained from registration lists of scheduled educational programs, as well as sign-in sheets at county extension offices and phone logs from each member of the professional staff during a 30-day period. The selected clients were randomly assigned to one of the three treatment groups:

1. *Mail only*: The request for a response includes only the mail mode (n = 465). This has been the mode used during the past 5 years.
2. *Mail/Web choice*: The choice to respond by mail or Web is offered in both the initial mailing and follow-up mailing of the questionnaire (n = 464).
3. *Mail preference*: The initial request for a response includes only the Web mode and the follow-up provides a choice of Web and mail (n = 473).

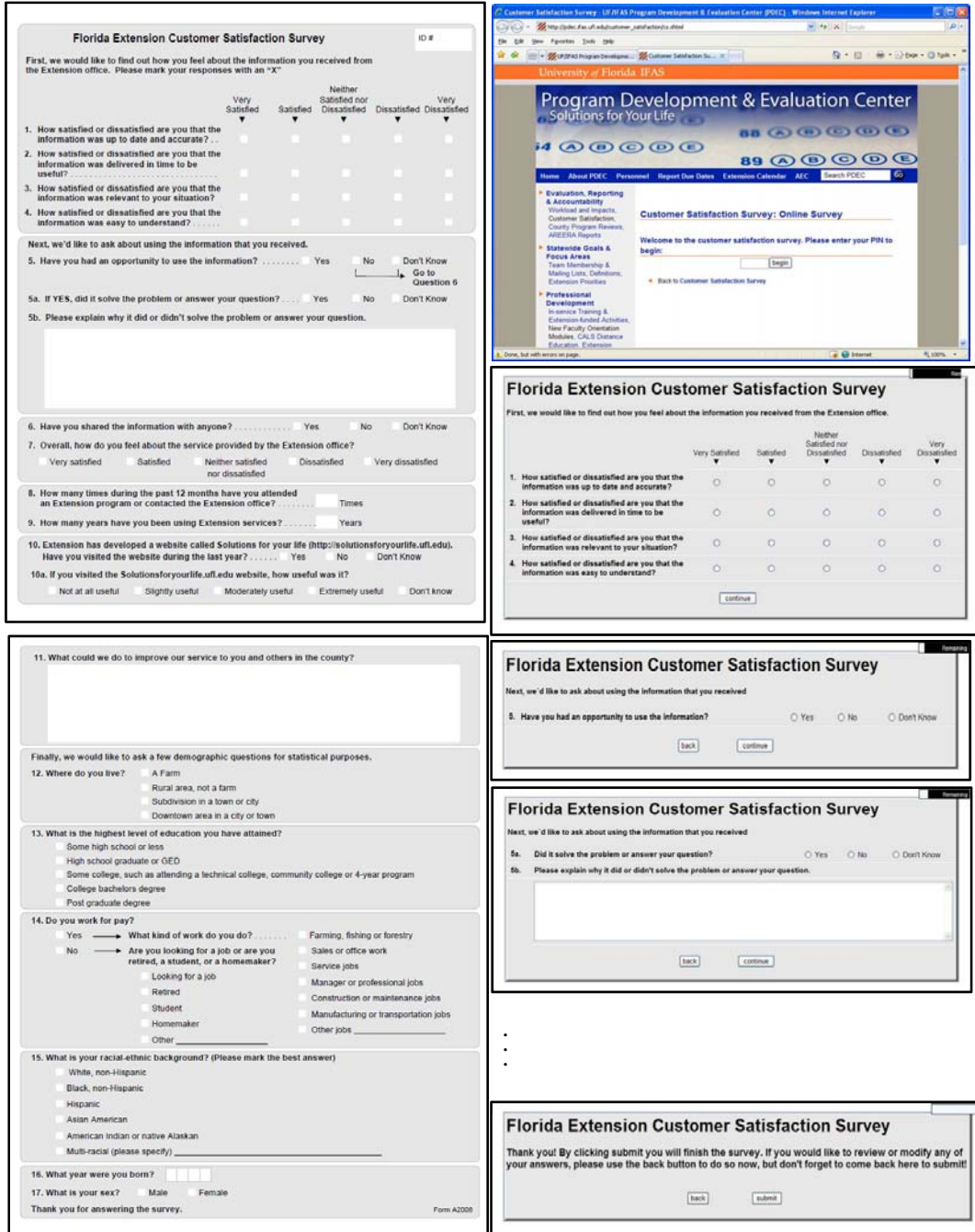
The mail and Internet surveys were constructed to follow Dillman et al.'s (2009) unimode design principles. This included using the same questions and question order and, more importantly, working to minimize differences in visual design. The pages of the mail questionnaire and selected screens of the Internet survey are shown in Figure 1. The mail questionnaire was a 2-page and printed on a single 8.5" x 11" sheet of paper. In addition to the black text, gray shading was used to create the figure-ground contrast to distinguish answer spaces and blocks of related questions. Similarly, the Internet survey presented questions in groups, such as items 1 – 4, or singly on separate screens (Figure 1). Space

limitations on the mail version of the survey prevented the use of one question per block format that was used for most of the Web screens. The fonts for the question stems and response options, as well as the spacing between response options were constructed, however, to provide the same visual presentation.

Figure 1: Design of the mail and Web questionnaires.

Mail

Web



The Internet survey was hosted on a university Website and constructed using custom html code. Respondents using the Web were required to type to url into their browser's address bar and enter a 6-digit PIN number to access the survey (see the top screen capture for the Web survey in Figure 1). Upon entry, the informed consent was presented, along with “Agree to participate” or “Do not agree to participate” buttons. When the “agree” button was selected, the screen containing the initial questions was presented.

The correspondence was constructed to provide the same verbal and visual presentation to the sampled clients. Additional information, including the url for the survey and a PIN number, was included in the invitation letter and the follow up letter to clients who were in the mail/Web choice or the Web preference treatments. A series of contacts were used to implement the survey during the summer and fall, 2008, as shown in Figure 2. As to be expected, some clients who received the Web preference invitation did not have a computer or access to the Internet. These clients were assured that they would receive a copy in the mail. A few clients who called or emailed the author because of difficulty accessing the survey on the Web were sent an email message containing a link to the survey and their PIN number. Each person in this latter group successfully completed the Internet version of the survey.

Figure 2: Survey Procedures by Experimental Treatment

Schedule (in days)	Mail only	Mail/Web choice	Web preference
-3	Standard pre-notice letter	Standard pre-notice letter	Standard pre-notice letter
0	Invitation letter Questionnaire Postage-paid return envelope	Invitation letter including URL and pin number Questionnaire Postage-paid return envelope	Invitation letter including URL and pin number
7	Standard reminder postcard	Standard reminder postcard	Standard reminder postcard
21	Reminder letter Replacement questionnaire Postage-paid return envelope	Reminder letter including URL and pin number Replacement questionnaire Postage-paid return envelope	Reminder letter including URL and pin number Replacement questionnaire Postage-paid return envelope

4. Findings

4.1 To what extent will Extension clients respond to a survey via the Web?

In answering this question, I use the response rate to the mail only treatment as the standard for comparison since this mode has been used since 2003 to collect the data. As shown in Table 1, a total of 282 clients (64.5%) responded to the mail only invitation. The response rate in 2008 is slightly higher than previous years (58.2% in 2003, 51.0% in 2004, 63.6% in 2005, 63.3% in 2006 and 60.1% in 2007).

When clients were presented with a choice of responding by mail or Web, 258 surveys were completed (59.2%), which was comprised of 51.4% by mail and 7.8% by Web. The Web preference treatment, where clients were first given the link to the Internet survey and later the choice of mail or Web, resulted in the lowest response rate (52.6%). The

Table 1: Response Rates by Experimental Treatment

Treatment	Sample size ^a	Mail completes	Web completes	Total completes	Percent responding by mail	Percent responding by Web	Total response rate ^b
Mail only	437	283	0	282	64.8%	0%	64.8%
Mail/Web choice	436	224	34	258	51.4%	7.8%	59.2%
Web preference	445	104	130	234	23.4%	29.2%	52.6%
Total	1318	611	164	774			

^aUndeliverable and ineligible were subtracted from the reported sample size.

^bResponse rates were calculated as (total completed/sample size)*100.

response for this treatment group was higher by Web (29.2%) than by mail (23.4%). The mail/Web choice treatment generated just a small minority of responses by Web (13.2%) while the Web preference treatment generated a majority (55.5%) of the responses via the Web. The Web preference treatment results show that a substantial proportion of extension clients can be enticed to respond via the Internet but the mail/Web choice treatment suggests that more would prefer the mail survey if given the choice.

4.2 How does the quality of data differ between Internet and mail responses?

Unit nonresponse, as discussed above, is one measure of quality. Item nonresponse also is a relevant measure of data quality and can indicate questions that may be poorly constructed or objectionable. The results in Table 2 shows that item nonresponse did not differ substantially between modes. Of the 16 items examined, the mean item nonresponse was 3.7% and 2.8% for mail and Web respondents, respectively. Tests for

Table 2: Item non-response (% missing) by response mode

<i>Demographic items</i>	Mail	Web	Difference	p-value ^a
Age	5.9	2.4	3.5	.075
Sex	3.4	1.2	2.2	.137
Race	4.4	1.8	2.6	.126
Educational attainment	2.6	.0	2.6	.036
Place of residence	4.1	.0	4.1	.008
Employment status	2.1	2.4	-.3	.811
<i>Use of CES services items</i>				
Number of years	11.5	10.4	1.1	.690
Number of contacts last year	6.7	6.1	.6	.775
Visited Solutions for your life Website	1.3	.6	.7	.457
<i>Satisfaction and outcome items</i>				
Information accuracy	1.3	3.1	-1.8	.124
Timely delivery	1.6	3.1	-1.5	.245
Information relevance	1.6	3.1	-1.5	.245
Ease of understanding	2.1	3.7	-1.6	.262
Opportunity to use information	3.4	3.1	.3	.804
Shared information with another	4.8	2.4	2.4	.193
Overall satisfaction	2.1	.6	1.5	.194
<i>Mean % item non-response</i>	3.7	2.8	.9	

^aThe p-value is the significance level based on the Chi-square test for independence

the individual items show either no significant difference or lower item nonresponse for the Web mode (as was the case for educational attainment and place of residence).

4.3 Do clients who use the Web differ from those responding by mail?

Given that some clients will respond via the Internet, an analysis of how Web and mail respondents might differ is important. First, characteristics of Web and mail respondents from Web preference treatment group are compared. Smyth et al. (2009) suggest that if there are no differences or only small ones between Web and mail respondents, then one can be confident that a survey using the Web only would provide representative results. With this in mind, the results in Table 3 show that clients who responded via the Web differ from those who responded by mail on a number of characteristics. Clients who responded via the Web were younger than those who responded by mail (53.9 and 59.8 years, respectively). Respondents using the Web also tended to have higher levels of educational attainment (especially some college or completed a college degree) than did those responding by mail. Clients using the Web to respond were more likely to be working for pay (60.6%) than those responding by mail (47.1%), which reflects some of the age-based differences noted above. Finally, clients responding by the Web were much less likely to report living on a farm or in a downtown area of a city or town (10.8% and 5.4%, respectively) than those responding by mail (25.7% and 40.6%, respectively).

Table 3: Comparison of responses by mode for the Web preference treatment

<i>Demographic items</i>	Mail	Web	Difference	p-value
Age (mean)	59.8	53.9	5.9	.003
Sex (% Female)	52.5	62.5	-10.0	.131
Race				
White, non-Hispanic	92.9	94.5	-1.6	.901
Black, non-Hispanic	4.0	2.4	1.6	
Hispanic	2.0	2.4	-.4	
Other	1.0	.8	.2	
Educational attainment				
Some high school or less	4.9	2.3	2.6	.010
High school graduate or GED	27.5	12.3	15.2	
Some college	31.4	43.0	-12.6	
College bachelors degree	19.6	30.0	-10.4	
Post graduate degree	16.7	12.3	4.4	
Place of residence				
Farm	25.7	10.8	14.9	.000
Rural, non-farm	29.7	35.4	-5.7	
Subdivision in a town or city	4.0	48.4	-44.4	
Downtown area in a city or town	40.6	5.4	35.2	
Employment status (% work for pay)	47.1	60.6	-13.5	.000
<i>Use of CES services items</i>				
Number of years (mean)	9.1	9.0	.1	.947
Number of contacts last year (mean)	4.1	8.6	-4.5	.000
Visited Solutions for your life Website				
Yes	7.8	36.2	-28.4	.000
No	90.3	60.8	29.5	
Don't know	1.9	3.1	1.2	

Table 3: Comparison of responses by mode for the Web preference treatment (cont.)

<i>Satisfaction and outcome items</i>	Mail	Web	Difference	p-value
Information accuracy^a				
Very dissatisfied/Dissatisfied/No opinion	3.9	5.5	-1.6	.030
Satisfied	34.0	18.8	15.2	
Very satisfied	62.1	75.8	-13.7	
Timely delivery^a				
Very dissatisfied/Dissatisfied/No opinion	4.9	10.2	-5.3	.157
Satisfied	32.0	23.4	8.6	
Very satisfied	63.1	66.4	-3.1	
Information relevance^a				
Very dissatisfied/Dissatisfied/No opinion	6.8	7.8	-1.0	.318
Satisfied	35.0	25.8	9.2	
Very satisfied	58.3	66.4	-8.1	
Ease of understanding^a				
Very dissatisfied/Dissatisfied/No opinion	2.9	5.5	-2.6	.025
Satisfied	32.4	17.3	15.1	
Very satisfied	64.7	77.2	-12.5	
Opportunity to use information				
Yes	85.0	80.5	4.5	.639
No	12.0	16.4	4.4	
Don't know	3.0	3.1	.1	
Shared information with another				
Yes	71.7	81.3	-9.6	.114
No	27.3	16.4	10.9	
Don't know	1.0	2.3	-1.3	
Overall satisfaction^a				
Very dissatisfied/Dissatisfied/No opinion	3.9	4.6	-.7	.038
Satisfied	34.0	19.2	14.8	
Very satisfied	62.1	76.2	-14.1	
Response to open-ended questions				
Description of the problem/solution				
Percent providing description	48.1	47.7	.4	.953
Words (mean)	21.0	44.2	-23.2	.000
Themes (mean)	1.1	1.2	-.1	.400
Suggestions for CES improvements				
Percent providing suggestion	59.6	60.0	-.4	.952
Words (mean)	19.3	43.4	-24.1	.019
Themes (mean)	1.1	1.3	-.2	.026

^aThe responses categories were combined in calculating the Chi-square statistic.

In addition to the demographic differences, clients using the Web differed from those using mail on two of three service utilization variables. Though response mode showed only a trivial difference in the mean number of years that clients have used extension's services, clients responding via the Web reported twice the number of contacts during the last year as did those responding by mail (8.6 and 4.1, respectively, Table 3). Even more striking is that the former group was more than four times more likely to have visited extension's *Solutions for your life* Website (which serves as FCES' portal to information on a host of topics) than did clients responding by mail (36.2% and 7.8%, respectively).

The influence of demographic attributes and use of CES' services on the mode of responding is examined further using logistic regression. The dependent variable, response mode, is coded 1 for Web and 0 for mail. The parameter estimates of the model for demographics in Table 4 show that those who were less than 60 years of age or who lived in a subdivision of a town or city were more likely to respond via the Web. The model adding CES usage measures shows that visiting CES' *Solutions for your life* Website increased the likelihood of responding via the Web (those visiting the Website were 4.8 times more likely to respond using the Web). The number of Extension contacts and years using Extension's services also suggest a trend that more extensive involvement with Extension is associated with responding via the Web.

Table 4: Logistic regression of responding via the Web on selected demographic, CES usage and outcome variables (n=215).

	Demographics		With CES usage		With Outcomes	
	Estimate	p-value	Estimate	p-value	Estimate	p-value
Intercept	2.979	--	2.164	--	.400	--
Male	.001	.999	-.005	.990	-.091	.827
Nonwhite	-.717	.352	-.487	.564	-.558	.525
Some college or more	.657	.126	.818	.080	.676	.150
Over 60 years old	-1.329	.001	-1.326	.005	-1.401	.004
Residence						
Farm	-3.651	.000	-4.618	.000	-4.882	.000
Rural, nonfarm	-2.151	.000	-2.532	.000	-2.784	.000
Subdivision in a town or city	--	--	--	--	--	--
Downtown area in a city or town	-4.546	.000	-4.486	.000	-4.789	.000
<i>Use of CES services</i>						
# of CES contacts last year			.048	.081	.046	.077
Years using CES			.039	.098	.040	.093
Visit CES Website			1.852	.001	1.760	.002
<i>Client outcomes</i>						
Overall Satisfaction					.378	.216
Shared info with others					.567	.294
Model Chi-square	100.887		123.862		127.458	
df	7		10		12	
% concordant	84.1		90.0		90.4	
R ² analog	34.2		42.0		43.2	

Since response mode differences were found for a number of client demographics and service utilization measures, the Web and mail responses were combined into their respective treatment groups – mail/Web choice and Web preference, to examine whether the combined data produced results that were comparable to the standard – the mail only treatment. The results in Table 5 show that demographic characteristics of both the mail/Web choice and the Web preference treatments were significantly different for only one measure, place of residence. Residence for the Web preference treatment was significantly different with a larger percentage of respondents reporting living in a subdivision in a town or city that did respondents for the mail only or mail/Web choice treatments. For other variables, the differences were trivial as illustrated by that for age -- the mean differed by only .2 years between the mail only, mail/Web choice, and Web preference respondents. Nonsignificant differences between the treatment groups were evident for sex, race, educational attainment, and employment status. The extension

service utilization variables also showed no significant difference between the treatment groups for the number of years using extension, number of contacts with extension during the last year, and whether the client had visited the *Solutions for your life* Website.

Table 5: Comparison of responses by treatment

<i>Demographic items</i>	Mail only	Mail/Web choice	Web preference	p-value†
Age (mean)	56.7	56.8	56.6	.978
Sex (% Female)	55.2	53.5	58.2	.592
Race				
White, non-Hispanic	91.8	96.0	93.8	.542
Black, non-Hispanic	4.5	2.4	3.1	
Hispanic	1.9	.8	2.2	
Other	1.9	.8	.9	
Educational attainment				
Some high school or less	1.8	2.0	3.5	.937
High school graduate or GED	19.9	18.9	19.0	
Some college	38.6	38.2	37.9	
College bachelors degree	25.4	23.6	25.4	
Post graduate degree	14.3	17.3	14.2	
Place of residence				
Farm	12.5	11.8	17.3	.000
Rural, non-farm	35.2	38.2	32.9	
Subdivision in a town or city	6.8	9.8	29.0	
Downtown area in a city or town	45.7	40.2	20.8	
Employment status (% work for pay)	51.5	55.9	54.6	.155
<i>Use of CES services items</i>				
Number of years (mean)	10.1	10.2	9.0	.460
Number of contacts last year (mean)	5.8	5.6	6.6	.457
Visited Solutions for your life Website				
Yes	17.3	18.4	23.6	.284
No	80.5	80.4	73.8	
Don't know	2.2	1.2	2.6	
<i>Satisfaction and outcome items</i>				
Information accuracy ^a				
Very dissatisfied/Dissatisfied/No opinion	4.3	7.9	4.8	.357
Satisfied	22.7	23.4	25.5	
Very satisfied	73.0	68.7	69.7	
Timely delivery ^a				
Very dissatisfied/Dissatisfied/No opinion	4.7	9.2	7.8	.165
Satisfied	22.4	22.5	27.3	
Very satisfied	72.9	67.3	64.9	
Information relevance ^a				
Very dissatisfied/Dissatisfied/No opinion	6.9	7.9	7.4	.409
Satisfied	22.8	27.8	29.9	
Very satisfied	70.3	64.3	62.8	

Table 5: Comparison of responses by treatment (cont.)

<i>Satisfaction and outcome items</i>	Mail only	Mail/Web choice	Web preference	p-value [†]
<i>Ease of understanding^a</i>				
Very dissatisfied/Dissatisfied/No opinion	4.0	5.6	4.4	.872
Satisfied	25.8	26.3	24.0	
Very satisfied	70.2	68.1	71.6	
<i>Opportunity to use information</i>				
Yes	79.3	75.9	82.5	.415
No	18.5	20.9	14.5	
Don't know	2.2	3.2	3.1	
<i>Shared information with another</i>				
Yes	77.0	79.2	77.1	.446
No	18.6	17.6	21.2	
Don't know	4.5	3.3	1.8	
<i>Overall satisfaction^a</i>				
Very dissatisfied/Dissatisfied/No opinion	4.7	7.1	4.3	.462
Satisfied	21.5	22.2	25.8	
Very satisfied	73.8	70.6	70.0	
<i>Response to open-ended questions</i>				
<i>Description of the problem/solution</i>				
Percent providing description	56.0	52.7	47.9	.180
Words (mean)	25.7	25.9	33.9 ^b	.005
Themes (mean)	1.2	1.2	1.2	.583
<i>Suggestions for CES improvements</i>				
Percent providing suggestion	59.9	62.4	59.8	.795
Words (mean)	22.1	23.1	32.7 ^b	.056
Themes (mean)	1.2	1.2	1.3	.229

[†]Chi-square test for independence was used to determine the significance of treatment difference for categorical and ordinal variables and analysis of variance was used for joint and pair-wise treatment differences.

^aThe responses categories were combined for calculating the Chi-square statistic.

^b Pairwise comparison is significantly different from mean for Mail only and Mail/Web choice treatments.

4.4 Are there substantively important differences in customer satisfaction?

The satisfaction and outcome items in Table 3 show that clients responding via the Web differ somewhat from those responding by mail. Specifically, the two groups differ on two items measuring service quality (information accuracy and ease of understanding) with clients responding via the Web having a larger percentage reporting “Very satisfied” (75.8% and 77.2%, respectively) than did those responding by mail (62.1% and 64.7%, respectively). The other two service quality items (timely delivery and information relevance) show a similar, but nonsignificant trend. Two outcome measures, having an opportunity to use the information and sharing the information with another person, did not have different results by response mode. But a larger percentage (76.2%) of clients responding via the Web reported that they were “Very satisfied” with the overall service of the extension office than did those responding by mail (62.1%). Finally, the logistic regression results in Table 4 showed that neither of the client outcome measures included in the model (overall satisfaction and sharing information) were significant influences on response mode net of the effects of the demographic and usage variables.

Additional differences by response mode were evident for the two open-ended items in the survey in the bottom section of Table 3. For clients who had had an opportunity to use the information, one open-ended item asked the client to describe whether the information had solved the problem and why. There was no significant difference by mode for the probability of providing a description, but clients who responded via the Web typed an average of twice as many words (44.2) as the number written (21.0) by those who completed the survey by mail. The larger number of words in the problem explanation by clients using the Web did not result in significantly more themes than for clients using the mail survey. Similar results were found for the second open-ended item, which asked how extension could improve its services, on the probability of providing a response and for the average number of words. The average number of themes (1.3) was significantly higher for clients using the Web than for those using mail (1.1).

Though there are a number of differences by response mode in the substantive items, both those measuring customer satisfaction and the open-ended responses, examination of the comparisons among the three treatment groups show no significant differences with the exception of the mean number of words for the two open-ended items (see Table 5). The mean number of words (33.9) in responses to the problem explanation item for the Web preference treatment was significantly higher than for both the mail only and mail/Web treatment groups (25.7 and 25.9, respectively). Similarly, the Web preference group wrote more words (a mean of 32.7) in suggesting improvements that extension could make than did the mail only and mail/Web treatment groups (22.1 and 23.1, respectively). In sum, combining Web and mail responses for clients in the mail/Web choice and the Web preference treatments resulted in response distributions for the substantive items that are similar to those for the mail only treatment. The remaining difference lies in the amount of words in the open-ended items.

5. Conclusions and Discussion

This study shows that the Internet can be used to collect information from meaningful numbers of extension clients, a quasi-general public population. The logistic regression results showed that the response mode was associated with both demographic attributes and engagement with Extension's services. Although Smyth et al. (2009) did not find a net effect for the demographic attributes in their study, several of those included here did matter. The reason for the relationship of residence with response mode is not clear but one can speculate that the residential categories reflect a combination of factors, including educational attainment, which make subdivision residents different from the other categories. The finding that older persons are less likely to respond via the Web is consistent with data on access to the Web, which is lower for older persons (Pew Internet & American Life Project 2009), and studies that indicate elders are less adept at meeting complex cognitive challenges, which includes responding via the Web (Stern et al. 2007).

In short, this study supports the view of Smyth et al. (2009) and Miller et al. (2002) that the differences between those who responded via the Web and those responding by mail should warn survey professionals to avoid relying on the Web alone to conduct surveys of the general public. An exception would be if nearly all of the target population has access to the Internet. When this is the case, mode differences might be minimized because the population is homogeneous with regard to Internet access and, thus, the results more similar (McCabe et al. 2006). In addition, the similarity of the results between the mail only, mail/Web choice and Web preference treatments suggests that

mixed-mode surveys can be considered as an option for collecting data from address-based and client lists. The results across the treatment groups were remarkably consistent with the recent study by Smyth and others (2009).

On the down side, response rates were reduced for the two treatments involving the Internet, more so when clients were pushed to use the Web (as in the case of the Web preference treatment). This might result in less data being available for the intended analysis and designed precision if the lower response rate isn't factored into calculations for the initial sample size. Regarding data quality, analysis of item nonresponse suggests that clients can complete Web surveys as well as mail surveys and the design of Web pages can be used to prevent errors on branching questions that occur on mail surveys.

It is not clear why the response rate is lower when the Web is included. One possibility is that the extra text in the invitation letter added to the visual density and might have been a factor (in the sense of creating a negative visceral reaction) in discouraging some clients from responding. The data also suggest that relatively few respondents were motivated enough to go to the computer, type in the url and a PIN number, and then complete the Internet version. Although the mail/Web choice treatment response rate was somewhat lower than that for the mail survey, the negative effect of choosing might have been reduced because the simplicity of the short, 2-page printed survey clearly conveyed to recipients of the mail/Web treatment that the response task was quick and easy. This supports Dillman's (2009) hypothesis that the complexity and uncertainty in responding via the Web might act as a disincentive for potential respondents.

It is also noteworthy that respondents using the Internet had twice as many contacts with extension during the last year and, consequently, had been more motivated to respond using this mode, as reflected by the higher percentage that reported "very satisfied" responses to the service quality and overall satisfaction items. This is consistent with leverage-salience theory (Groves, Singer & Corning 2000) in that the Internet aspect might have impacted the motivation for responding and resulted in the observed differences in the characteristics between Web and mail respondents. In short, the salience of the invitation to respond via the Web was likely to be more important (that is, have greater leverage) for some extension clients than for others. The observed differences in respondents by mode, coupled with the arguments of leverage-salience theory, give weight to Dillman et al.'s (2009) recommendations that broad-based appeals should be designed for survey invitations and mixed-mode approaches should be considered as an alternative to a Web-only method.

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