BETTER LATE?
CHARACTERISTICS OF LATE RESPONDENTS TO A HEALTH CARE SURVEY

Esther M. Friedman, Nancy A. Clusen, Mathematica Policy Research
Michael Hartzell, Department of Defense
Esther M. Friedman, 600 Maryland Ave SW Washington, DC 20024 (efriedman@mathematica-mpr.com)

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1. Introduction

Nonresponse bias occurs when nonrespondents differ from respondents on characteristics relating to the survey topics. When nonresponse is not ignorable, inferences made from these data may be biased. Although it is often difficult to obtain data on nonrespondents to mail surveys, data on late respondents (respondents whose surveys arrive after the fielding period) are more easily accessible. These late cases interest researchers, as their characteristics may differ from those of early respondents and may even suggest important characteristics, which may be used in nonresponse compensation procedures.

Much of the research on late respondents has been performed using telephone interviews, with reluctance to be interviewed, typically, measured on a continuum, with a greater number of callbacks indicating more reluctance to be interviewed on the part of a respondent. This "continuum of resistance" model (Fitzgerald and Fuller, 1982; Lin and Schaeffer, 1995) posits that individuals who require the most contacts before participating in a survey are also the most resistant to being interviewed, and the more resistant a respondent, the more similar he is to the most resistant individuals in the population—the nonrespondents. However, both studies by Fitzgerald and Fuller (1982) and Lin and Schaeffer (1995) have mixed results, with Lin and Schaeffer finding more arbitrary results than anticipated and Fitzgerald and Fuller finding some differences between respondents at various points on the continuum, but no similarities between reluctant respondents and nonrespondents. It is not surprising, then, that Stinchcombe, et al. (1981) found significant differences between late responders and hard-core refusers, or that other researchers believe that reluctant respondents are a distinct group, similar in part to nonrespondents, in part to early respondents, and possessing characteristics uniquely their own (Cohen, 2000; Kay, et. al. 2001). Bates and Creighton (2000), too, found mixed results in a study of almost five percent of the latest/most difficult cases in the CPS, with fewer than 10 percent of the late interviews resembling nonrespondents.

Sometimes, rather than use a continuum of resistance, researchers choose, instead, to study response as a dichotomous variable indicating early versus late response (Bates and Creighton, 2000), or as a tri-level variable with early, middle, and late response, where middle respondents respond to a second mailing and late respondents only respond to a telephone follow-up (Eisenhower and Hall 1995). This approach is especially prevalent in mail surveys, since data collected from these surveys typically involve no more than two or three follow ups, and it is sometimes difficult to track which follow-up a respondent is responding to.

Studies that specifically focus on late interviews have found some differences between early and late respondents, although these differences are not always strong. Several studies, however, have found at least some demographic differences between early and late respondents. Late responders tend to be younger (Voight, 2000; Brogger, et al. 2003), are more likely to be non-white (Voight, 2000), are more likely to be male (Brogger, et al. 2003), and are less educated (Voight, 2000, Brogger, et al. 2003, Bernick and Pratto, 1994) than are early respondents. Interestingly, Kennickell (1998) also found differences between early and late responders in terms of data quality. He found that the fraction of refusals increases with the number of contacts. This may indicate that late responders are more likely to refuse to answer questions, as they are not really interested in participating in the survey.

Several health studies have also found late respondents to be different from early respondents, with late respondents being less healthy than early respondents. Late respondents are more likely than early respondents to be smokers (Voight, 2000; Brogger, et al. 2003), and they have significantly higher levels of alcohol consumption (Novo, et al. 1999). Late respondents also have worse self-reported mental and emotional health overall (Grotzinger et al., 1994), lower physical health scores (Etter and Perneger 1997), and less healthy lifestyles (Grotzinger et al, 1994). However, these results are somewhat inconsistent, with late respondents not differing significantly from early respondents on the Eysenck personality scale or on 22 questions about neuropsychological symptoms (Ruoling, et al. 2003). Moreover, Gasquet, et al. (2001) found no difference in

satisfaction with medical care between early and late respondents.

In this paper, the characteristics of late respondents to the Health Care Survey of DoD Beneficiaries, a quarterly mail survey, are compared to those of early respondents, with regard to demographic characteristics, beneficiary and enrollment status, satisfaction with the military insurance, usage of health care and services, self-reported physical and mental health, and quality of response. This study further investigates the impact of late response on survey estimates and concludes with the implications of the findings.

2. Method

2.1 Adult Health Care Survey of Department of Defense Beneficiaries Design

The Adult Health Care Survey of Department of Defense Beneficiaries (HCSDB) is designed to monitor experience with, access to, and care provided by the Military Health System (MHS). The HCSDB has been conducted annually since 1995, and was first fielded quarterly in 2001. The samples for the 2002 HCSDB quarterly surveys were selected using a stratified sample design, stratified by geography, enrollment status, and beneficiary group. In order to account for the survey design and to control for the biasing effects of nonresponse, weights were calculated for each quarter of data. The final weight includes a sampling weight that reflects the differential selection probabilities used to sample beneficiaries across strata and weighting class adjustments for non-response. The quarterly surveys were mailed to representative, independently selected samples of 45,000 MHS beneficiaries per quarter. The mailing consists of a notification letter (mailed about a month before the survey), questionnaire, reminder/thank you postcard (mailed two weeks after the first mailing), and a follow-up questionnaire, with the entire fielding period lasting eight weeks.

2.2 Late Respondents to the HCSDB

At the end of the year, the four quarters of data are rolled into one combined annual dataset to allow for small area estimates (for further details, please see Friedman, et al. 2002). Any survey arriving after the cut-off for its respective fielding period is deemed a late respondent, for it was too late to be included in the quarterly dataset. These surveys may be late because they are submitted in response to the follow-up postcard or the second survey, or possibly because they were detained in the mail. Unfortunately, specific information as to why these surveys are late or what prompted these respondents to finally respond is unavailable. Nonetheless, if these data differ from data received before the eight-week cut-off, excluding these surveys may introduce the possibility of bias into the survey.

As these data must be reprocessed in order to create the annual dataset, late respondents to the first three quarters are added into the annual dataset, and the data are reweighted. Also, as the quarterly datasets are combined immediately after quarter four is fielded, late respondents to the fourth quarter are not added. Response rates for the three quarters before the addition of the late respondents range from 29.03 percent (for quarter one) to 29.42 percent (for quarter two), with the addition of late respondents increasing the response rate by slightly under 2 percent for each quarter.

3. Results

3.1 Frame Variables

The sampling frame contains a number of demographic variables and several variables relating to military and enrollment status for all individuals surveyed in 2002. Some of these variables, such as enrollment status (enrolled in TRICARE, the military health insurance, versus not enrolled) and beneficiary group (active duty, active duty family member, retirees under 65, and retirees over 65 years of age) are used in adjustments for non-response. Other variables, however, may also be important to consider for adjustments if they indicate significant differences between early respondents and late respondents, especially if these characteristics are similar to those found to be significantly different between respondents and nonrespondents.

In a study of nonresponse in the HCSDB, Clusen, et al. (2002) found several differences between respondents and nonrespondents to the HCSDB. They found that both nonrespondents and nonlocatable beneficiaries are younger than respondents, are more likely to serve in active duty or be a family member of someone in active duty, and are more likely to be enlisted. Nonlocatable beneficiaries are also more likely to be male. If late respondents are in fact similar to nonrespondents, as some studies suggest, it would be expected that some of these variables would be found to be significantly different between late respondents and early respondents.

Several demographic variables and variables relating to military and enrollment status were tested using logistic regression models modeling late (versus early) response for each quarter of data, to see if there were significant differences between early and late respondents. The variables include marital status, gender, race, age (divided into quartiles), indicator variables for enrollment in TRICARE and residence in the

continental US (CONUS), and beneficiary status (active duty, dependent of active duty, retiree less than 65 and retiree 65 and over). Charts 1a to 1c (for quarters one to three in 2002, respectively) reveal the odds ratios and 95 percent confidence intervals for each of these variables. Although there are some slight discrepancies between the three quarters, for all three quarters of 2002, respondents who have never been married are more likely to respond late than married respondents. Furthermore, respondents who are younger, who are not enrolled in TRICARE, and, as compared to active duty beneficiaries, respondents in all other beneficiary groups are more likely to be late respondents. Interestingly, respondents residing outside of the continental United States are also more likely to respond late. This may indicate that perhaps one reason that their surveys arrive after the fielding period is merely that the mail takes longer.

3.2 Satisfaction with TRICARE

It might be supposed that one reason for sending a survey back late is dissatisfaction with the service being evaluated by the survey. Perhaps late respondents are dissatisfied with TRICARE and are therefore reluctant to fill out this survey for the military, or perhaps, conversely, beneficiaries who are the most dissatisfied are the first to send their surveys back since they want to make it known that they are unhappy and why. In any event, it is plausible to believe that satisfaction with TRICARE could impact the speed in which a respondent completes the survey. To test this hypothesis, several dichotomous variables measuring satisfaction (or rather, lack thereof) with TRICARE are modeled using a logistic regression model. Since many of the frame variables were found to be significant, the aforementioned frame variables were controlled for when running this model. However, as the results in Charts 2a to 2c (for quarters one to three, respectively) indicate, none of the dichotomous variables measuring satisfaction were found to be significantly different for the two groups. Although this runs counter to the hypothesis, it is consistent with the results found by Gasquet, et al. (2001).

3.3 Health Usage

One study shows that nonrespondents have a lower utilization of health care than do respondents (Lamers, 1997). Certainly, this is not surprising, as those who utilize more health care and health services are probably more interested in a health survey, have more opinions to contribute, and just plain care more about the impact their responses may have. If this were the case, would not late respondents send their surveys in late since they, too, utilize fewer health care services and are therefore not eager to complete and mail back their surveys?

Charts 3a to 3b depict the odds ratios and 95 percent confidence intervals, obtained from a logistic regression model (once again, controlling for the aforementioned frame variables), for several dichotomous variables measuring health care utilization, including several tests and exams a health conscious individual would be expected to have taken during the course of the year.

Furthermore, since several studies found smoking to be one variable which is significantly different between early and late respondents, a dichotomous variable indicating whether one has smoked 100+ cigarettes in his/her life, and whether or not one was advised to quit smoking in the last year, were also modeled and are included in these charts. Only one of these variables was found to be significant--whether or not one has had a general physical exam in the last year--with late respondents being less likely to have had one than early respondents. Although these results are in the hypothesized direction, they are only significantly different at better than the 0.05 level for quarter three, but not for the other two quarters of 2002, so it is difficult to know whether this is in fact a significant finding or just an anomaly.

3.4 Self-Reported Health

There is a debate in the health-related survey literature as to whether respondents are more or less healthy than are nonrespondents. Although healthier individuals are more physically able to respond to surveys than the ill and infirm, less healthy people may take the time to respond since they are more personally interested in the subject of the survey, namely, their health; whereas, healthier individuals do not feel like they will personally benefit by responding to the survey (Cohen and Duffy, 2002). Although health information is unavailable for nonrespondents to the HCSDB, it might be interesting to see which, if either, of these theories is true of late respondents. It may be that they respond late because they are in ill health or, alternatively, because they are so healthy that they do not deem it worth their while to bother with a health survey. In quarter one, 2002, a supplement to the survey asked respondents to measure their physical and mental health using eight Short Form 36 health scales. Scores on each dimension are scaled from 0 (worst health) to 100 (best health). A logistic regression model was once again used to model late response, and the beta and p-values are depicted in Table 1. Although none of these variables differed significantly between early and late respondents, just to be sure that there were no significant differences, two new, dichotomous variables were constructed measuring below median mental health and below median physical health. Neither of these variables proved to be significant, either, as can be seen in Chart 4.

3.5 Quality of Response

There are several measures of data quality in the HCSDB survey. Respondents who return surveys with too many missing or incomplete values or with key items left blank, will typically be treated as nonrespondents. However, data quality varies from survey to survey, even for respondents.

Perhaps respondents whose surveys arrive after the fielding period are not only lax about returning their surveys, but maybe they are also more lax about completing all of the items, or they prefer to submit responses of "don't know" or "not applicable" rather than spend time on the questionnaire. In order to test this hypothesis, several variables measuring the number of responses of "don't know," and "not applicable," and the number of missing values were once again tested for significant differences between early and late respondents using a logistic regression model, and controlling for significant frame variables. Although there appear to be no significant variables for quarter two, for both quarters one and three, there are several variables which are significantly different for the two groups, with late respondents having consistently worse data quality, with significantly more responses of "don't know" and "not applicable," more blank responses, and more total responses recoded as missing (due to being filled in as dk, n/a, or blank). Please see Table 2 for further details.

Though this finding may seem minor, as most of these missing values can be easily imputed or excluded from analyses, it may point to a much greater problem. Maybe late respondents are late because they take the survey less seriously, and perhaps their greater number of missing responses is just another symptom of this indifference to the survey. Moreover, if late respondents are, in fact, more indifferent to the survey, are not all of their responses suspect? What if they are not taking any of the questions seriously and, in some cases, rather than leave a question blank they make up an answer or just do not take ample time to think it through? This may indicate that even the responses late respondents do provide are less reliable and credible.

4. Conclusions

Late respondents differ from early respondents and nonrespondents in terms of enrollment status, beneficiary status, age, marital status, and whether or not they reside in the US. However, for the most part, they do not appear to differ from early respondents in terms of satisfaction with TRICARE, health usage, and self-reported mental and physical health. Late respondents were also found to have significantly poorer data quality, which may indicate that many of their other responses are less reliable, as well. Perhaps quality would be improved if a different mode were used as the follow-up rather than a second mail questionnaire, or perhaps a shorter or easier survey may improve response.

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Chart 1a: Frame Variables
Odds Ratios for Late Respondents to Early Respondents
Quarter 1, 2002

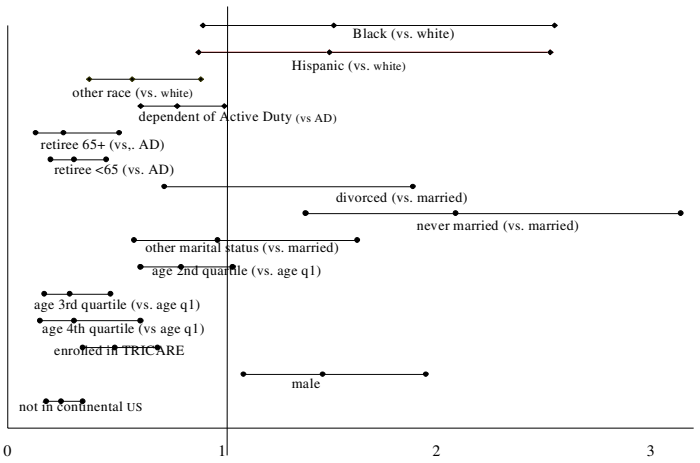

Chart 2a: Satisfaction with TRICARE
Odds Ratios for Late Respondents to Early Respondents
Quarter 1, 2002

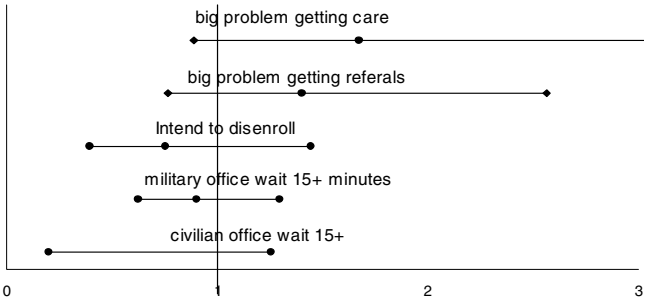

Chart 1b: Frame Variables
Odds Ratios for Late Respondents to Early Respondents
Quarter 2, 2002

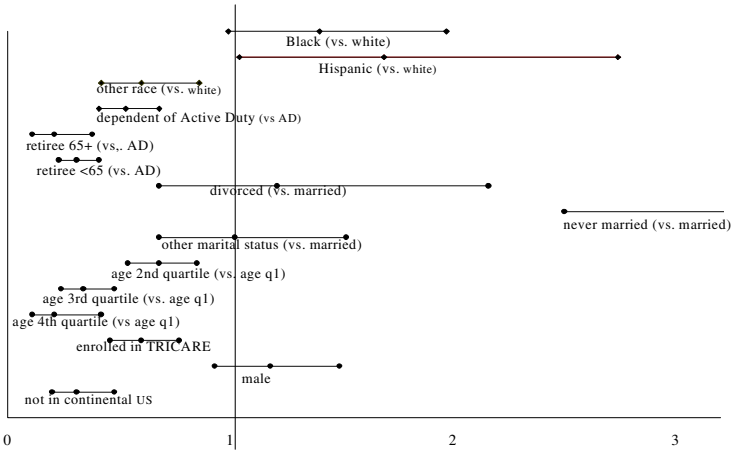

Chart 2b: Satisfaction with TRICARE
Odds Ratios for Late Respondents to Early Respondents
Quarter 2, 2002

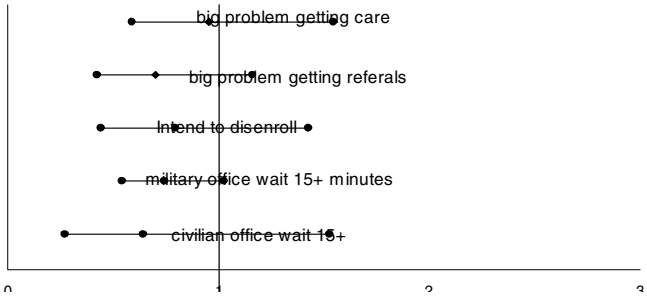

Chart 1c: Frame Variables
Odds Ratios for Late Respondents to Early Respondents
Quarter 3, 2002

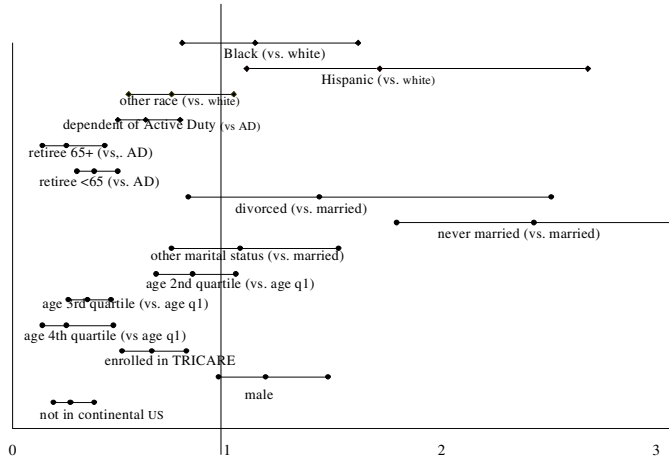

Chart 2c: Satisfaction with TRICARE
Odds Ratios for Late Respondents to Early Respondents
Quarter 3, 2002

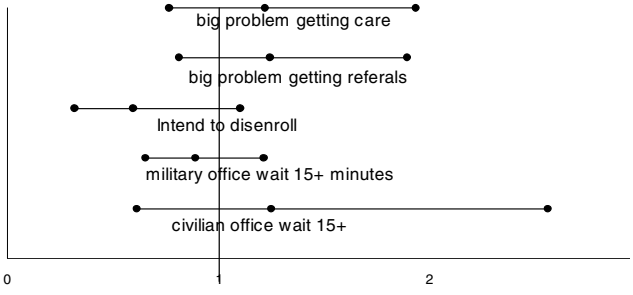

Chart 3a: Health Usage
Odds Ratios for Late Respondents to Early Respondents
Quarter 1, 2002

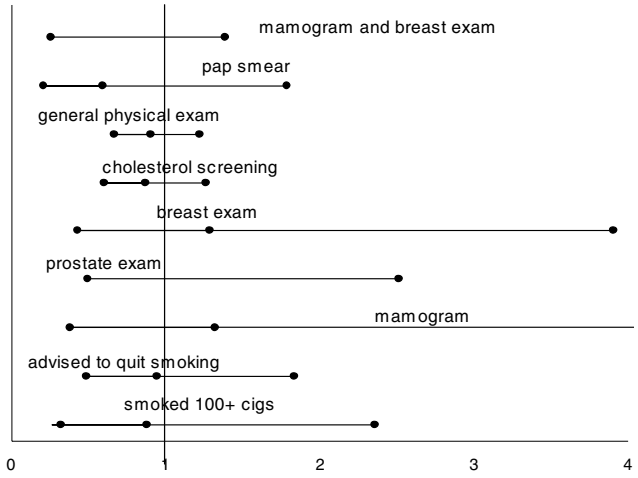

Chart 3b: Health Usage
Odds Ratios for Late Respondents to Early Respondents
Quarter 2, 2002

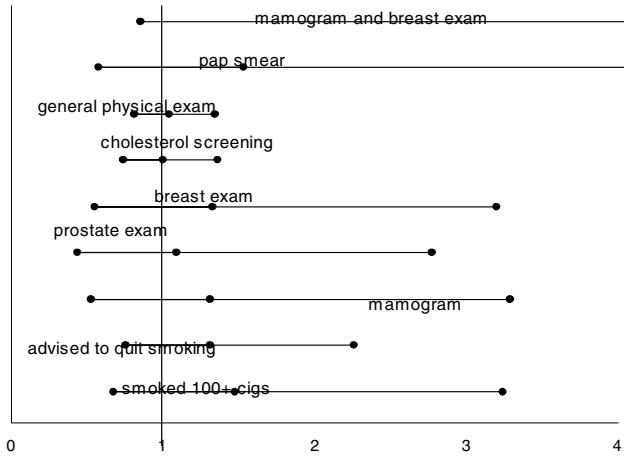

Chart 3c: Health Usage
Odds Ratios for Late Respondents to Early Respondents
Quarter 3, 2002

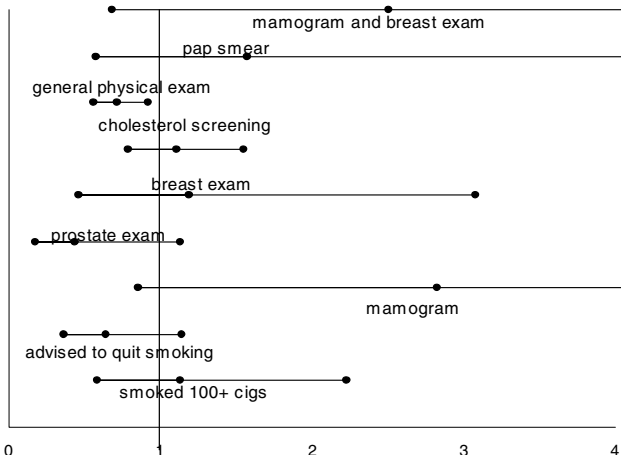

Table1: Beta Coefficients and Significance Levels for SF-8 Supplement in Quarter 1 only

VARIABLE	DESCRIPTION	BETA	P
PCS_8	Physical Health Summary	0.010	0.41
MCS_8	Mental Health Summary	-0.006	0.54
SF8PF	physical functioning	0.013	0.34
SF8RP	role physical	-0.001	0.93
SF8BP	bodily pain	-0.005	0.68
SF8GH	general health	-0.007	0.63
SF8VT	vitality	0.003	0.81
SF8SF	social functioning	-0.001	0.90
SF8RE	role emotional	-0.005	0.77
SF8MH	mental health	-0.009	0.41

Chart 4: Median Health
Odds Ratios for Late Respondents to Early Respondents
Supplement in Quarter 1 only

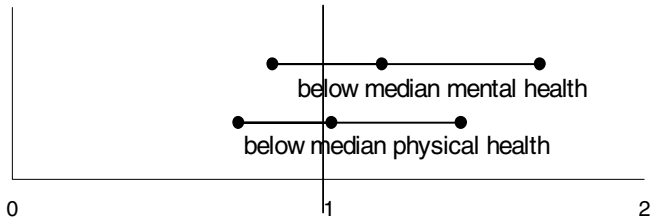

Table 2: Beta Coefficients and Significance Levels for Quality of Response Variables
Quarter 1 - Quarter 3, 2002

	Q1		Q2		Q3	
DESCRIPTION	BETA	P	BETA	P	BETA	P
# responses DK	0.21	0.02*	-0.12	0.09	0.07	0.14
# responses n/a	0.02	0.29	0.00	0.80	0.03	0.03*
# multiple responses	-0.12	0.40	-0.06	0.64	-0.22	0.16
# blank responses	0.02	0.04*	0.01	0.33	0.01	0.07
total # missing	0.03	0.01**	0.01	0.38	0.02	0.01**

** indicates significance at p<0.05*

*** indicates significance at p<0.01*