Increasing Response Rates for Mailed Surveys of Medicaid Clients and Other Low-income Populations

P. Joseph Gibson,1 Thomas D. Koepsell,2-4 Paula Diehr,3,5 and Christiane Hale3,6

Mailing surveys to low-income populations is often avoided because of concern about low response rates. In this study, the authors used a mailed survey of a low-income population to test whether $1.00 or $2.00 cash-response incentives were worth the expense and whether 2-day priority mail ($2.90 postage) would yield a sufficiently higher response rate than certified mail ($1.52 postage) to justify its cost. In 1994, 2,243 randomly selected families in subsidized health care programs in Pierce County, Washington, were randomly sent no incentive, $1.00, or $2.00 in the first of three mailings. For the third mailing, nonrespondents were randomly assigned to receive either certified or 2-day priority mail. After 4 weeks, the response rates were 36.7%, 48.1%, and 50.3% for the no-incentive, $1.00, and $2.00 groups, respectively. After three mailings, the cost per response was the lowest for the group that received $1.00. The response rate for the certified mailing (28.1%) was significantly higher than the rate for the more expensive priority mailing (21.7%). No incentive-related bias was detected. The authors concluded that the most efficient protocol for this low-income population was to use a $1.00 incentive in the first mailing and a certified third mailing. Am J Epidemiol 1999; 149:1057-62.

bias (epidemiology); costs and cost analysis; data collection; health care surveys; Medicaid; postal service; poverty; questionnaires

High response rates are essential to avoiding potential nonresponse bias and achieving stable estimates from surveys. Concern about low response rates often leads researchers to avoid mailed questionnaires in favor of more expensive survey methods. In low-income populations, where a significant percentage of households may not have telephones, face-to-face interviews are often preferred (1). There has been little study of how incentives and refinements to mailed survey protocols can increase response rates in these populations. A mailed survey protocol that produced adequate response rates in low-income populations would provide a relatively low-cost means of collecting data from this hard-to-reach, often-underrepresented population.

Sending a cash-response incentive with a questionnaire has been one of the most dependably effective techniques for increasing response rates. Incentives of more than $0.50 have consistently increased response rates for surveys of various groups in the United States, with larger amounts producing higher response rates (2-19). To our knowledge, the effect of a cash incentive has not been evaluated in low-income populations.

When follow-up mailings are sent to nonrespondents, a special method is sometimes used for the final mailing to distinguish it from routine correspondence. Follow-up certified mailings have been shown to increase response rates (20). Recently, other delivery methods have become available, including 2-day priority mail. Little information is available about the relative effect of certified versus 2-day priority mail on response rates.

This study evaluated the effect of no, $1.00, and $2.00 cash incentives in a mailed survey targeting a low-income population. We hypothesized that the response rate would increase as the incentive increased and that the no-incentive to $1.00 increase would be greater than the $1.00 to $2.00 increase. The study also compared the use of certified mail versus 2-day priority mail for the final mailing to nonrespondents. The effects of the various protocols on nonresponse bias and answer bias were evaluated.

MATERIALS AND METHODS

This study of response rates was part of a larger study of access to health care in a fee-for-service ver-
sus capitated health care system (21). In that study, subjects were surveyed shortly before and 1 year after their Medicaid system changed from fee-for-service to capitation. The present study was conducted within the baseline survey.

Population

All subjects were residents of Pierce County, Washington, who had been clients of either of two health care systems for low-income families, Medicaid or the Washington Basic Health Plan (BHP), for at least 6 months. The Medicaid programs included in this study were for families that contained children or pregnant women and had incomes below 185 percent of the federal poverty level. Excluded were Medicaid subjects whose language, as recorded in Medicaid records, was not English. The BHP provides subsidized health care for families below 200 percent of the federal poverty level. To increase comparability with the Medicaid families, BHP families were required to have at least one child enrolled in the BHP program. (Pregnant women in the BHP are automatically switched to a Medicaid program.) No language information was available for BHP subjects.

A random sample of 1,512 Medicaid and 799 BHP study subjects was drawn from all eligible families that included at least one member who had been enrolled continuously in the respective program from July to December 1993. Five Medicaid subjects declined to participate after receiving a study notification letter. Sixty-one Medicaid and two BHP subjects’ first questionnaire mailing packets were returned as undeliverable. This analysis is limited to the remaining 1,446 Medicaid and 797 BHP subjects.

The study identification numbers of 239 BHP subjects were mistakenly omitted when the second mailing was prepared. Included were 114 subjects in the $1.00 incentive group and all 125 subjects in the $2.00 incentive group. These subjects were censored from all analyses that used data from after the second mailing. Over one-fifth (149) of these 239 subjects had returned their questionnaires before the second mailing.

Protocol

Each mailing included the questionnaire, an endorsement letter from community groups, a prepaid business reply envelope, and a personalized, signed cover letter from the county health department. The questionnaire asked about the health, access to health services, use of services, satisfaction with services, and demographics of the respondent and his or her family. All mail was sent via first class, with addresses printed directly on the mailing envelopes. The certified mail was metered; standard postage stamps were used for all other mail.

Figure 1 is a flowchart of the study design. Approximately 1 month before the first mailing, potential subjects received a letter describing the survey and providing a phone number to call if they did not want to participate. Since other studies consistently found that cash incentives increased response rates, only one-sixth of our subjects were sent no cash incentive in the first mailing. Two-thirds of the subjects received a $1.00 bill, and the remaining one-sixth received $2.00. A cover letter in the packets with cash incentives included the statement, “Keep the enclosed $1.00 (or $2.00) as thanks for your participation.” One week after the first mailing, a reminder postcard was mailed to all potential respondents. Three weeks after the postcard reminder, the second mailing of the questionnaire was sent to nonrespondents. Three weeks after that, the remaining nonrespondents were randomized into two equal groups and were sent the final mailing via certified mail or 2-day priority mail. All randomization was performed separately for the Medicaid and BHP study groups.

![Flowchart of the study design](image-url)
The postal service makes three attempts to deliver certified mail in person to anyone at the address listed on the mail. After three attempts, a notice is left instructing the addressee to pick up the mail at the post office. Ten days later, unclaimed certified mail is returned to the sender. Two-day priority mail is delivered in large, colorful envelopes, which are left in the addressee’s mailbox with the regular mail.

Analysis

The effect of the cash incentive was assessed just before the second mailing and again 1 month after the third mailing to evaluate whether the effect was attenuated by repeated mailings. All analyses controlled for health care system (Medicaid vs. BHP). Logistic regression was used to test for a linear trend in the response-rate odds ratio for each $1.00 increase in the cash incentive.

To assess whether the cash incentive influenced respondents' answers, responses to six questions about satisfaction with health care were used as the dependent variables in separate least-squares regressions; the independent variables were incentive level and study group. In separate models, incentive level was represented as a linear variable or as two dummy variables representing any incentive and the $2.00 incentive. Analyses were performed for subjects who responded before the second mailing as well as for all respondents.

One month after the third mailing, we compared the effects on response rates of using certified mail versus 2-day priority mail. Yates' adjusted p values were calculated by using EpilInfo software (Centers for Disease Control and Prevention, Atlanta, Georgia). The potential interaction between cash incentive and special mailing method was evaluated by using a multiplicative interaction term in logistic regression.

We analyzed characteristics of the respondents and nonrespondents to determine whether the cash incentive or third mailing method had an especially strong impact on the response rate for any definable subgroup of subjects. Separate logistic regression analyses were run to test the interaction of the presence of an incentive with the following subject characteristics: gender, age, length of enrollment, zip code area median income, number of health care visits during a 3-month period, and race. The analyses of race and number of health care visits were limited to Medicaid subjects. All other models controlled for health care system (Medicaid vs. BHP).

For each group, a cost per subject and cost per response were calculated by using the cumulative costs and response rates just before each mailing. To allocate the previous cumulative costs and response rates between the certified and 2-day priority mail groups, the total costs and responses before the third mailing were divided in proportion to the number of subjects in each group. The marginal cost per additional response is not presented here but can be calculated for any two groups by dividing the difference in the cost per initial subject by the difference in the response rates.

Not counting the incentive, each mailing packet cost about $1.50, and each postcard cost about $0.44. Certified mail cost an additional $1.00 and 2-day priority mail an additional $2.38. These costs included postage (in 1995), printing, and assembly of the packets. The costs did not include the return postage or the labor required to sign the cover letters, manage the address data, or log the returned questionnaires.

RESULTS

The gender, age, family size, and education of the two populations were fairly different (table 1). The Medicaid demographics were consistent with a population composed primarily of single mothers. The BHP population was more educated, was somewhat older, and tended to live in slightly wealthier areas.

Cash incentive

Response rates were much higher for BHP subjects than for Medicaid subjects (table 2). However, the incentives had similar effects on each group's odds of response (data not shown). Compared with the subjects who received no incentive, the response rate for those who received the $1.00 incentive was more than

<table>
<thead>
<tr>
<th>TABLE 1. Characteristics of the low-income groups studied to determine rates of response for mailed surveys, Pierce County, Washington, 1994</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Medicaid</td>
</tr>
<tr>
<td>Basic Health Plan</td>
</tr>
</tbody>
</table>

* SD, standard deviation.
The hypothesized trend of increasing response with increasing incentive was statistically significant both after just one mailing and at the close of data collection (table 3). However, its significance was driven by the difference between no incentive and any incentive. The difference in the response rates between the $1.00 and $2.00 incentives was not significant at either evaluation time. The difference was most pronounced among BHP subjects.

There was no significant interaction between the cash incentive and the third mailing method in relation to the final response rates. In addition, the effects of the cash incentive and of the third mailing method in relation to the final response rates. In addition, the effects of the cash incentive and of the third mailing method were not significantly associated with a subject’s gender, age, income, family size, length of enrollment, enrollment status when the survey began, or number of health care visits by the subject’s family. Finally, there was no significant association between the cash incentive and of the third mailing method in relation to the final response rates.

<table>
<thead>
<tr>
<th>Group</th>
<th>Incentive</th>
<th>No.</th>
<th>Before second mailing</th>
<th>Before third mailing</th>
<th>1 month after third mailing</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cost ($)</td>
<td>Response rate (%)</td>
<td>Cost ($)</td>
</tr>
<tr>
<td>Medicaid</td>
<td>None</td>
<td>239</td>
<td>6.84</td>
<td>27.6</td>
<td>7.49</td>
</tr>
<tr>
<td></td>
<td>$1.00</td>
<td>968</td>
<td>7.26</td>
<td>39.8</td>
<td>7.40</td>
</tr>
<tr>
<td></td>
<td>$2.00</td>
<td>239</td>
<td>9.48</td>
<td>41.0</td>
<td>9.30</td>
</tr>
<tr>
<td>Basic Health Plan</td>
<td>None</td>
<td>173</td>
<td>3.84</td>
<td>49.1</td>
<td>3.89</td>
</tr>
<tr>
<td></td>
<td>$1.00</td>
<td>499</td>
<td>4.49</td>
<td>64.3</td>
<td>4.34†</td>
</tr>
<tr>
<td></td>
<td>$2.00</td>
<td>125</td>
<td>5.72</td>
<td>68.0</td>
<td>†</td>
</tr>
</tbody>
</table>

* Calculated as cumulative mailing costs divided by the number of responses.
† The first 239 of the randomly assigned subject identifiers were omitted erroneously in generating the second mailing: all 125 of the $2.00 incentive Basic Health Plan subjects, and 114 of the $1.00 incentive Basic Health Plan subjects, 64 of whom had responded before the second mailing. All 239 subjects were excluded from subsequent analyses. Consequently, the number of subjects in the $1.00 incentive Basic Health Plan group after the first mailing was 395.

Table 3: Odds ratios of survey response rates for different cash incentives after one mailing and at close of data collection among Medicaid and Basic Health Plan enrollees, Pierce County, Washington, 1994

<table>
<thead>
<tr>
<th>Trend of increasing response with increasing cash incentive</th>
<th>Odds ratio</th>
<th>95% confidence interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before second mailing</td>
<td>1.63</td>
<td>1.35–1.97</td>
</tr>
<tr>
<td>1 month after third mailing</td>
<td>1.30</td>
<td>1.05–1.60</td>
</tr>
<tr>
<td>Difference in response between $1.00 and $2.00 incentives</td>
<td>1.09</td>
<td>0.86–1.38</td>
</tr>
<tr>
<td>Before second mailing</td>
<td>0.92</td>
<td>0.69–1.23</td>
</tr>
<tr>
<td>1 month after third mailing</td>
<td>1.82</td>
<td>1.45–2.28</td>
</tr>
<tr>
<td>Difference in response between no cash incentive and any cash incentive</td>
<td>1.42</td>
<td>1.12–1.79</td>
</tr>
</tbody>
</table>

Table 4: Third-mailing response rate 1 month after surveys were mailed to Medicaid and Basic Health Plan enrollees who received all previous mailings and the postcard reminder, Pierce County, Washington, 1994

<table>
<thead>
<tr>
<th>Group</th>
<th>Mailing method</th>
<th>No.</th>
<th>Response rate (%)</th>
<th>χ² value</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>Certified</td>
<td>398</td>
<td>28.1</td>
<td>0.046</td>
</tr>
<tr>
<td></td>
<td>2-day priority</td>
<td>396</td>
<td>21.7</td>
<td></td>
</tr>
<tr>
<td>Medicaid</td>
<td>Certified</td>
<td>326</td>
<td>25.5</td>
<td>0.157</td>
</tr>
<tr>
<td></td>
<td>2-day priority</td>
<td>327</td>
<td>20.5</td>
<td></td>
</tr>
<tr>
<td>Basic Health Plan</td>
<td>Certified</td>
<td>72</td>
<td>40.3</td>
<td>0.156</td>
</tr>
<tr>
<td></td>
<td>2-day priority</td>
<td>69</td>
<td>27.5</td>
<td></td>
</tr>
</tbody>
</table>

* The Basic Health Plan subjects who were omitted from the second mailing were excluded from this analysis.
tives or the third mailing method and subjects’ responses to the six questions concerning their satisfaction with health care.

As mentioned previously, certified mail addressees receive notices and may have to go to the post office to collect their certified mail. In the second year of this survey (not presented in this paper), 3 of the 923 subjects who received certified mail called or wrote comments expressing annoyance at receiving the survey via certified mail. In the first year of this survey, none of the 413 certified mail subjects expressed annoyance at the mailing method.

Cost per response

The cost per response (table 2) was initially higher in the incentive groups because of the additional cost of the incentives. Among Medicaid subjects, before the second mailing, $6.84 had been spent for every response in the no-incentive group versus $7.26 in the $1.00 incentive group. Among BHP subjects, whose response rate was higher, $3.84 had been spent per response in the no-incentive group versus $4.49 in the $1.00 incentive group.

However, the proportion of subjects requiring a follow-up mailing was lower among those who received a cash incentive, since their initial response rate was higher. At the close of data collection, the cost per response was lower for subjects in the $1.00 incentive group than for those in the no-incentive group. Among Medicaid subjects in the certified mail protocol, $8.50 was spent per response in the no-incentive group versus $8.06 per response in the $1.00 incentive group. Among BHP subjects in the same protocol, the per-response cost was $4.41 for the no-incentive group and $4.57 for the $1.00 incentive group. Compared with the 2-day priority mail group, the certified mail group’s cost per response was consistently much lower, and the cumulative response rate was almost always higher.

DISCUSSION

Mail versus telephone surveys

This study achieved a high response rate relative to response rates reported in several other surveys of Medicaid subjects. Some surveys have relied on telephone interviews rather than mailed surveys. Telephone surveys of Medicaid populations lose many subjects because clients’ numbers are unlisted or have been disconnected, or clients lack telephones. In this study, the local telephone company could provide telephone numbers for only 89 of the 649 Medicaid non-respondents. Other telephone surveys of low-income populations have secured valid telephone numbers for only a quarter of their original samples (22).

A major advantage of mail surveys for Medicaid populations is that each state’s Medicaid enrollment database contains fairly current addresses. Many Medicaid clients receive monthly checks (income supplements) from the government and so have a strong motivation to keep their addresses current in the enrollment files.

Many mailed surveys of Medicaid clients have used a single mailing. These surveys tend to achieve response rates of 15–40 percent (Cliff Greenlick, Oregon Department of Human Resources, personal communication, 1994; Joyce Beaulieu, University of Kentucky, personal communication, 1994). Among our study’s Medicaid subjects, including a $1.00 incentive with just one mailing increased the cost per response by 6 percent but also increased the response rate by 12 percent. However, even with this increase, the one-mailing survey response rate would still cause concern about nonresponse bias in the results. Among more responsive populations, such as the BHP subjects, a single mailing with a $1.00 incentive may achieve an adequate response rate.

The BHP versus Medicaid difference in response rates may be related to underlying differences between the two groups (23, 24). In this study, the BHP enrollees tended to be slightly older and more educated. Survey responses showed that compared with Medicaid clients’ perceptions of the Medicaid program, BHP clients also tended to be very satisfied with their health care program and to hold it in high regard. This higher regard may have increased the BHP subjects’ willingness to respond.

The final response rate of more than 53 percent with no cash incentive is somewhat higher than the rates achieved in similar protocols with Medicaid subjects. The difference may have been due to characteristics of both the survey and the population. In our study, much effort was devoted to assuring that the questionnaire, mailing packets, and survey protocol conveyed to each respondent that his or her reply mattered. The study population was almost entirely English speaking.

Certified mail both was less expensive than 2-day priority mail and produced a better response. However, certified mail presented some disadvantages, including slightly more preparation and a few respondents who were upset about receiving something they considered unimportant via such an officious mailing method.

As the number of mailings increased, the response rate advantage from the cash incentive decreased. Presumably, some of those who responded to the first mailing only because of a cash incentive would have been captured in subsequent mailings anyway.
Nevertheless, the cash incentive also captured respondents who otherwise would not have responded at all; after three mailings, the improvement in the response rate due to the cash incentive remained statistically significant.

Cost and accuracy

The goal of most surveys is accurate estimation of a population parameter. Accuracy is a function of both nonresponse bias and standard deviation. Maximizing response rates tends to minimize nonresponse bias. Maximizing the absolute number of responses minimizes the standard deviation of the resulting estimate. Were nonresponse bias not a consideration, the protocol with the lowest cost per response would be used—in this study, a single mailing with no cash incentive. This protocol produced about 18 percent more responses per dollar than three mailings with the $1.00 incentive. Standard deviation is inversely proportional to the square root of the number of responses minus 1, so an 18 percent increase in responses would decrease the standard deviation of the estimate by only a small amount, unless there were very few initial subjects. Given that there is no way to predict with confidence how much nonresponse bias may occur, using the higher response protocol affords the most confidence in the accuracy of the results. This conclusion is especially true among relatively unresponsive populations such as the Medicaid population in this study.

ACKNOWLEDGMENTS

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REFERENCES