A Comparison of Strategies to Increase Household Survey Response Rates in a Predominantly Indigenous Community Population

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Abstract

The present study describes 4 strategies for increasing response rates to a community-based survey on youth violence in an ethnically diverse population in Hawai'i. A total of 350 households were mailed a Safe Community Survey using 4 different randomly assigned incentive strategies. The strategies varied by length of survey and timing of incentive for completion (given before completion, after completion, or both). In univariate analyses, there were no significant differences across survey strategies on participant demographics, community perceptions of violence-related behaviors, or percent of missing items. However, in multivariate regressions, respondents' sex and percent of missing items on the surveys were consistently significant predictors across multiple outcomes. Although the use of strategies to increase response rates in community-based surveys might be desirable, resulting data need to be examined for the potential that strategies might recruit different populations, which may have an impact on the data obtained. This study offers lessons and recommendations for surveying Native and Indigenous communities.

Keywords

Indigenous, Native Hawaiian, survey response, community research, youth violence

Abbreviations and Acronyms

AAPI = Asian Americans and Pacific Islanders
APIYVPC = Asian/Pacific Islander Youth Violence Prevention Center
Std = standardized estimate
Unstd = unstandardized estimate

Introduction

Community-based surveys of injury and violence are a widely used method of collecting otherwise unavailable data.[1] Such surveys have limitations (eg, higher costs, difficulty accessing homes, safety of interviewers, selection bias, and sampling error), which can often be overcome with well-designed mail surveys.[1,2] Even utilizing methods with strong evidence of effectiveness, however, response rates and sample representativeness can still pose threats to conclusions. Careful examination of methods used and their impact on data is necessary to ensure reliability and validity of data. This paper compares strategies for conducting mail surveys to assess perceptions of youth violence in a largely Indigenous population in Hawai'i.

Youth Violence Prevention

Although Asian Americans and Pacific Islanders (AAPIs) have been historically characterized as having lower rates of youth violence than other racial/ethnic groups,[3,4] studies disaggregating this population have found higher rates among subgroups.[5] Research in Hawai'i has found Native Hawaiian, Samoan, and Tongan youth have higher rates of violence, even when not taking into account covariates such as socioeconomic status.[6-10] The Asian/Pacific Islander Youth Violence Prevention Center (APIYVPC) aims to reduce and prevent interpersonal youth violence for AAPIs.[11-13] The Center's Safe Community Survey measured residents' perceptions of youth violence, and tested innovative survey methods with a predominantly Indigenous community.

Survey Methodology

Monetary incentives have long been used to increase response rates in mailed surveys. Although some responders will participate without compensation, others might make a cost-benefit decision (eg, time/effort to complete the survey).[14] For those potential respondents, incentives may increase their appraisal of the benefits of completion. In particular, it has been demonstrated that incentives are more effective in recruiting participants from low-income and minority communities, compared to more advantaged populations.[15] There is also evidence that effects of incentives vary by type and timing. Church's meta-analysis,[16] for example, reported that noncontingent incentives (ie, prepaid incentives delivered with the survey) show consistent effects on response rates (an estimated 19% improvement) while contingent incentives (ie, those delivered after completion of the survey) do not have a significant effect.

Several theories have been posed to explain the effects of non-contingent incentives. Social exchange theory suggests prepaid incentives are viewed by potential participants as an extension of trust and token of appreciation.[17] Potential participants are therefore motivated to live up to that expectation and are more likely to return the survey. Similarly, the norm of reciprocity posits that prepaid incentives engender a feeling of obligation in the potential participant, who is then motivated to return the

favor and complete the survey.[18] Leverage-salience theory offers a more general explanation, suggesting that what influences the decision to participate is not the same for everyone.[19] In other words, different design features (or levers) will motivate different groups to participate.

In addition to incentives, other survey design features such as topic, length, or sponsor of the survey might also influence responding.[20] Length of the survey, for example, might weigh into cost-benefit considerations, or might be daunting to those who have difficulty reading or understanding English. Familiarity with the sponsor might increase (or decrease) likelihood of responding. This is only a short list of all conceivable design features that might influence participation.

A question that follows is whether motivating different groups to participate provides different results. Much of survey method research has focused on response rates and nonresponse bias, but this is only 1 goal. Representativeness of the sample and data is equally, if not more important. Incentives or other strategies might draw respondents different than those who would otherwise not participate.[14-15, 20-21] If design features influence the sample, data quality, or response distributions, then conclusions must be informed by those differences.

Present Study

This study examined how incentives and survey length affected responses to the Safe Community Survey. The following protocols were assessed:

- Strategy A: 2-part, 199-item survey, $5 bill (noncontingent incentive), and stamped envelope so additional compensation could be mailed (contingent incentive). Participants who returned both parts of the survey received $65. If only part 1 was completed, they received $15.
- Strategy B: shorter 65-item survey and $5 bill.
- Strategy C: short survey and stamped envelope so $5 contingent incentive could be mailed.
- Strategy D: short survey, $5 noncontingent incentive, and stamped envelope so additional $5 incentive could be mailed.

The hypotheses, based on Dillman's theory,[17] were that higher response rates would be found for short surveys and the amount of incentive would exert influence. Additional hypotheses, based on Biner and Kidd's study,[14] were that the longer survey would have more missing items, as would the short survey for which respondents only receive an incentive after returning the survey. Higher representation of men and individuals with lower socioeconomic status was expected for Strategy A (largest incentive). Also expected was that individuals with vested interest in the topic would be more likely to be recruited, regardless of method.

Methods

Procedures

All procedures were approved by the University of Hawai'i at Mānoa Committee on Human Studies. A total of 350 households were randomly selected from 2 geographically adjacent communities on O'ahu – 175 households from each community – using the Hawai'i property tax database (ie, all addresses for the 2 communities were included in the sampling pool). Community A is more suburban with predominantly Caucasian residents and higher educational levels and income. The population of Community A is more than 4 times larger than Community B. Community B is more rural with a large population of Native Hawaiians, broader range of incomes, higher percent of owner-occupied residences, and larger family sizes. Injuries from assaults are consistently higher in Community B than Community A and the rest of the State.[22]

Of the 175 households selected from each community, 100 households were randomly assigned to Strategy A, while Strategies B, C, and D each received 25. More households were assigned to the long survey, because a goal of the project was to accomplish a comprehensive epidemiologic study of community perceptions of youth violence. The parallel use of Strategies B, C, and D allowed the various methodologies to be concurrently tested. Though multiple survey waves were conducted throughout the APIYVPC's history, data presented here stem from the 2009 survey administration, the inaugural implementation of the four survey strategies upon which subsequent survey waves (the Safe Community Survey and other APIYVPC surveys) were founded upon.

Measures

Instructions requested the adult household member with the most recent birthday complete the survey (if not possible, any adult member was eligible). Packets included a cover letter, a consent form to keep (returning the survey indicated consent), a stamped postcard to refuse participation, a long or short survey, a stamped envelope to return the completed survey, and a stamped envelope for the incentive (Strategies A, C, and D).

The short version consisted of 4 pages (65 questions, almost all multiple-choice and Likert-type): demographics; sense of community; youth physical and non-physical violence, and substance abuse; and community risk/protective factors (eg, economic stress, racism, family influences, and after school programs). The long version consisted of 10 pages (199 items) and included all items on the short version, plus additional multiple-choice or Likert-type questions about the respondent and the community, including items from the Sense of Community Index,[23] The Community Toolbox,[24] and Hawai'i Social Capital Benchmark Survey.[25] Community partners also contributed questions. The full survey is available upon request.

Youth Violence

Respondents were presented a list of 21 incidents, and asked if they *strongly agree*, *agree*, *disagree*, or *strongly disagree* that each item is a problem in their community regarding youth. Eight indicators of physical violence—*gang violence*, *physical violence*, *murder*, *robbery/burglary*, *bullying*, *sexual assault*, *dating violence*, and *ultimate fighting*—demonstrated acceptable internal consistency (Cronbach's alpha = 0.84). Three indicators of non-physical violence—*verbal/emotional violence*, *spreading rumors*, and *cyberbullying*—also demonstrated acceptable internal consistency (Cronbach's alpha = 0.77). Seven incidents, including *property damage*, *gangs*, *possession of weapons*, *loitering*, *truancy*, *reckless driving/speeding*, and *drunk driving*, formed a composite of youth delinquent behavior (Cronbach's alpha = 0.82). Scale scores were computed as the mean of all items within a construct, for respondents who answered at least 70% of items for a scale.

Youth Substance Use

Respondents were asked how problematic they viewed use of specific substances among youth in their community, using a scale of *Not used by youth*, *Used by youth but not a problem*, *Used by youth and somewhat of a problem*, or *Used by youth and a severe problem*. The long survey included 15 substances, and the short version included 4. The 4 items common to both surveys were *cigarettes/tobacco*, *beer*, *marijuana*, and *ice or crystal methamphetamine* (Cronbach's alpha = 0.84). Scale scores were computed as the mean of the 4 items, for all respondents who answered at least 3 (ie, 75%) of the items.

Demographics

Respondents were asked to indicate their sex, current age, and in which of the 2 communities they lived. Respondents also reported how many people live in the household (on a 10-point response scale from *1* to *10 or more*), and whether they rent or own the place they live, both of which were used as indicators of socioeconomic status. Parental status was obtained by asking whether or not the respondent has a child under the age of 18.

Analytic Strategy

Bivariate analysis using SAS version 9.4 software (SAS Institute Inc., Cary, NC) compared characteristics of the respondents and percentage of missing items across the 4 recruitment strategies, including Pearson chi-squared tests for categorical variables and analysis of variance (ANOVA) for continuous variables. Multivariate analysis determined the impact of recruitment strategy and demographics on the 4 outcomes—*physical violence, non-physical violence, delinquent behavior, and substance use.* Specifically, predictor variables included survey length, non-contingent incentive (yes/no), contingent incentive (yes/no), percent of missing items, age, sex, home ownership, number living in household, has a child, and community.

Results

Sample Description

Of the 350 surveys mailed, 56 were undeliverable. Of the 294 delivered surveys, 139 were completed, for a 47% return rate. Two-thirds of respondents were women, and respondents were likely to be homeowners and tended not to be parents (**Table 1**). Response rates by community were not significantly different, with approximately 50% of Community A and 45% of Community B surveys completed. There were significant differences based on household size and parental status. Community B respondents had more people on average living in their household (4.44 for Community B vs. 2.96 for Community A), and were more likely to have a child (44% for Community B vs. 25% for Community A). Both communities reported similar levels of physical violence, non-physical violence, delinquent behavior, and substance use. There was no significant difference in the percentage of items left blank (6% and 4% for Communities A and B, respectively).

Bivariate Analysis

As shown in **Table 2**, bivariate analysis revealed no significant differences by strategy in response rates, demographics, missing responses, and violence outcomes. Although numerically there appeared to be a wide spread in response rates, from a high of 55% for Strategy D to a low of 39% for Strategy C, the differences by strategy were not significant. Respondent groups were not significantly different with respect to age, sex, home ownership, household size, or parental status. Ratings of physical and non-physical violence, delinquent behavior, and substance use were similar regardless of strategy.

All strategies resulted in similarly low percentages of missing responses, ranging from an average of 6% for Strategy C, to 2% for Strategy D. Though not clearly reflected in the significance test for that variable, the standard deviations for missing responses were noticeably elevated for Strategies A and C (SDs = 15% and 16%), compared with Strategies B and D (SDs = 5% and 2%), suggesting more variability in missing responses among populations recruited by Strategies A and C.

Multivariate Associations

Across the violence-related outcomes, there were no significant effects of survey length or type of incentive. For physical and non-physical violence, and delinquent behavior (**Table 3**), sex was a significant predictor such that female respondents reported more of a community problem than males. Percentage of missing responses was also a significant predictor for those 3 outcomes, with individuals who completed fewer items reporting less problems. For non-physical violence, parental status was a significant predictor, with parents reporting more community problems than non-parents. Community, home ownership, and household size were not significant predictors for these models.

	Community A (n = 69) Mean (SD) or %	Community B (n = 70) Mean (SD) or %	Test of Significance[a,b] *Pearson chi-squared tests for categorical variables; ANOVA for continuous variables*
Table 1. Demographic and Outcome Variables by Community, Asian/Pacific Islander Youth Violence Prevention Center Safe Community Survey			
Response rate %	50%	45%	χ^2(1, N = 294) = 0.59, P = .44
Age (in years)	52.91 (15.40)	51.35 (13.74)	F(1, 130) = 0.38, P = .54
Sex			
Male	32%	34%	χ^2(1, N = 135) = 0.06, P = .81
Female	68%	66%	
Home Ownership			
Rent	17%	7%	χ^2(1, N = 137) = 3.18, P = .07
Own	83%	93%	
Number Living in Household	2.96 (1.68)	4.44 (2.73)	F(1, 137) = 14.85, P < .001
Has a Child			
No	75%	56%	χ^2(1, N = 115) = 4.60, P = .03
Yes	25%	44%	
Physical violence[c]	3.09 (0.74)	3.10 (0.62)	F(1, 136) = 0.01, P = .92
Non-physical violence[c]	3.31 (0.94)	3.50 (0.85)	F(1, 136) = 1.64, P = .20
Delinquent behavior[c]	3.51 (0.80)	3.57 (0.76)	F(1, 136) = 0.20, P = .66
Substance use[c]	3.21 (0.68)	3.24 (0.64)	F(1, 130) = 0.05, P = .82
Percent of items missing	5.82 (13.81)	4.21 (11.82)	F(1, 137) = 0.54, P = .46

[a] Chi-square results reported using format: χ^2 (degrees of freedom, N = sample size) = chi-square statistic value, P value
[b] ANOVA results reported using format: F (degrees of freedom) = F value, P value
[c] Physical violence, non-physical violence, delinquent behavior, and substance use were rated on 4-point scales, with higher scores indicating stronger agreement that the issue is a problem in the respondents' community.

To ensure collinearity was not masking effects of survey characteristics, bivariate correlations between each of the characteristics (survey length, noncontingent incentive, contingent incentive) also were examined. Results (not shown) indicated no significant bivariate relationships between any characteristic and any outcome.

Discussion

Participant recruitment is a concern of community-based researchers, particularly when investigating complex issues such as youth violence. This study investigated not only perceptions of youth violence in a largely Indigenous community, but also strategies to enhance participation in community-based epidemiologic studies. Response rates were not significantly different across strategies. However, the relatively large span of response rates (38.6% to 54.6%) suggests sample size and statistical power might have limited the ability to detect differences in this and other variables. The pattern of response rates was partially consistent with the hypothesis that the lowest rate would be with Strategy C. Though only suggested here, previous research supports the assertion that by ignoring the power of noncontingent incentives, researchers could be limiting their response potential.[16]

There were no significant demographic differences among samples. This was consistent with the hypotheses regarding parental status and age, but not with respect to lower socioeconomic populations and men. Strategies appeared to recruit groups similar in age and household size. However, sample size might have limited detection of differences, and generalization of findings to the State and beyond Hawai'i. Compared to the total population of Communities A and B,[26] more study participants were women (67% versus 47%) and home owners (88% versus 57%). Singer and colleagues[15] indicate that individuals in lower socioeconomic situations and men tend to be harder to recruit in research. Specifically, stability in one's housing situation has been associated with increased likelihood of survey participation.[27] This reiterates known limitations of methods that rely on mail, in terms of excluding houseless individuals and those in unstable housing situations.

There were also no significant differences in quality of data (missing responses) or in data obtained. This suggests reports of community perceptions were robust to the variations in the strategies. Given aforementioned concerns about statistical power, examination of means and standard deviations for the 4 outcomes was performed. In every case, highest and lowest values were separated by less than a standard deviation, suggesting null results are not simply a function of sample size.

Table 2. Demographic and Outcome Variables by Survey Strategy, Asian/Pacific Islander Youth Violence Prevention Center Safe Community Survey

	Strategy A [long, noncontingent and contingent incentives] (n = 80) Mean (SD) or %	Strategy B [short, noncontingent incentive only] (n = 18) Mean (SD) or %	Strategy C [short, contingent incentive only] (n = 17) Mean (SD) or %	Strategy D [short, noncontingent and contingent incentives] (n = 24) Mean (SD) or %	Test of Significance[a,b] *Pearson chi-squared tests for categorical variables; ANOVA for continuous variables*
Response rate	49%	41%	39%	55%	χ^2(3, N = 294) = 3.25, *P* = .35
Age	52.17 (14.42)	53.44 (17.52)	53.20 (11.71)	50.32 (15.28)	F(3, 128) = 0.18, *P* = .91
Sex					
Male	31%	24%	29%	52%	χ^2(3, N = 135) = 4.76, *P* = .19
Female	69%	76%	71%	48%	
Home Ownership					
Rent	11%	11%	6%	23%	χ^2(3, N = 137) = 2.95, *P* = .40
Own	89%	89%	94%	77%	
Number Living in Household	3.64 (2.41)	4.11 (2.42)	4.22 (2.58)	3.22 (2.11)	F(3, 135) = 0.79, *P* = .50
Has a Child?					
No	72%	63%	53%	59%	χ^2(3, N = 115) = 2.65, *P* = .45
Yes	28%	38%	47%	41%	
Youth physical violence[c]	3.15 (0.69)	2.97 (0.66)	3.05 (0.75)	3.04 (0.64)	F(1, 137) = 0.47, *P* = .70
Youth non-physical violence[c]	3.47 (0.88)	3.26 (0.96)	3.37 (0.98)	3.32 (0.9)	F(1, 134) = 0.38, *P* = .77
Youth delinquent behavior[c]	3.56 (0.76)	3.59 (0.85)	3.44 (0.91)	3.52 (0.72)	F(1, 134) = 0.14, *P* = .93
Youth substance use[c]	3.25 (0.67)	3.32 (0.51)	3.03 (0.86)	3.22 (0.53)	F(3, 128) = 0.63, *P* = .60
Percent of items missing	6.20 (14.71)	2.73 (5.05)	6.32 (16.44)	1.61 (2.05)	F(3, 135) = 1.02, *P* = .38

[a] Chi-square results reported using format: χ^2 (degrees of freedom, N = sample size) = chi-square statistic value, *P* value

[b] ANOVA results reported using format: F (degrees of freedom) = F value, *P* value

[c] Youth physical violence, non-physical violence, delinquent behavior, and substance use were rated on 4-point scales, with higher scores indicating stronger agreement that the issue is a problem in the respondents' community.

Linear regressions disentangled the effects of survey characteristics that might call conclusions into question. None of the characteristics (length, incentive type) predicted outcomes in the presence of demographic variables, community, and missing responses. Nor were any simple bivariate correlations between characteristics and outcome variables significant. Thus, survey strategy does not appear to have influenced the outcomes.

However, respondent sex and percentage of missing responses were significant predictors in 3 of the 4 regressions. Lower ratings of problems were reported by men and respondents who left more questions blank. This suggests strategies successful in recruiting more participants from these populations might result in dampened estimates of perceptions with those issues. It is not possible to determine for which groups the perceptions are more accurate, and thus, no recommendations can be made for attempting to or refraining from recruiting certain populations.

The relationship between missing responses and outcomes has implications for statistical techniques that impute values for missing data. In this study, the degree to which respondents left items blank was related to their reports of violence. Imputing data without taking that into account may lead to biases. Studies are needed to investigate the threshold of "incompleteness" (percentage of unanswered items) that merits omission rather than imputation.

Other limitations merit mention as well. Measures of socioeconomic status (home ownership, number in household) may not have been ideal. "Renter" typically refers to renting from a homeowner, not in apartments or public housing. Data from those demographics might lead to different results. Additionally, although home ownership is often a proxy of higher socioeconomic status, this might function differently in Community B, with a larger population on Hawaiian Homestead land. Whether results are generalizable beyond this population is a question for future investigations. However, Indigenous populations in the United States (Native Hawaiians and Native Americans included) tend to have similar, poorer health statistics than nonindigenous populations, suggesting results might generalize to other minority populations.[28]

Table 3. Estimates Predicting Youth Violence and Violence-Related Outcomes from Survey Characteristics and Demographic Variables, Asian/Pacific Islander Youth Violence Prevention Center Safe Community Survey

	Youth physical violence				Youth non-physical violence				Youth delinquent behavior				Youth substance use			
	Unstd[a]	SE[a]	Std[a]	P[a]	Unstd[a]	SE[a]	Std[a]	P[a]	Unstd[a]	SE[a]	Std[a]	P[a]	Unstd[a]	SE[a]	Std[a]	P[a]
Survey length[b]	0.081	0.18	0.061	-	0.257	0.25	0.141	-	0.061	0.21	0.04	-	0.016	0.18	0.013	-
Non-contingent incentive[c]	0.059	0.24	0.03	-	-0.032	0.32	-0.012	-	0.101	0.27	0.044	-	0.059	0.23	0.032	-
Contingent incentive[c]	0.053	0.23	0.028	-	0.104	0.31	0.039	-	-0.202	0.26	-0.091	-	-0.249	0.23	-0.135	-
Percent of items missing	-4.03	1.93	-0.211	$P = .039$	-6.418	2.6	-0.243	$P = .015$	-6.913	2.19	-0.314	$P = .002$	-0.88	2.18	-0.043	-
Age	0.012	0.01	0.251	$P = .043$	0.008	0.01	0.133	-	0.007	0.01	0.127	-	0.005	0.01	0.116	-
Sex[d]	0.312	0.14	0.226	$P = .031$	0.443	0.19	0.232	$P = .023$	0.349	0.16	0.219	$P = .034$	0.035	0.14	0.027	-
Home ownership[e]	0.248	0.19	0.133	-	0.148	0.26	0.057	-	0.175	0.22	0.081	-	0.036	0.19	0.02	-
Number living in household	-0.02	0.03	-0.077	-	-0.013	0.04	-0.036	-	-0.028	0.03	-0.095	-	-0.01	0.03	-0.044	-
Has a child[f]	0.181	0.18	0.133	-	0.586	0.24	0.31	$P = .017$	0.159	0.2	0.101	-	-0.092	0.18	-0.072	-
Community[g]	-0.011	0.14	-0.008	-	-27	0.19	-0.015	-	-0.013	0.16	-0.008	-	0.109	0.14	0.088	-
R²	0.141				0.183 ($P = .034$)				0.167				0.057			

[a] Multivariate regression analyses presented: Unstd = unstandardized estimate; SE = standard error; Std = standardized estimate; and P values for statistically significant items (ie, $P < .05$).
[b] Survey length was coded as short = 0, long = 1.
[c] Noncontingent incentive and Contingent incentive were coded as no = 0, yes = 1.
[d] Sex was coded as male = 0, female = 1.
[e] Home ownership was coded as rent = 0, own = 1.
[f] Has a child was coded as no = 0, yes = 1.
[g] Community was coded as Community A = 0, Community B = 1

Use of different strategies within communities could have resulted in information-sharing. Respondents might become aware that others could receive larger incentives, and might have been less inclined to participate. Finally, although linear regression analyses decomposed strategies into specific characteristics, the effect of amount of incentive ($70, $10, $5) could not be separated. Previous research suggests monetary compensation alone exerts a greater effect on response rate than increases in dollar amount.[29] Thus, reporting effects of amount was unlikely to provide insight to others using different survey lengths than these; although this warrants consideration for future studies.

The 2 communities were significantly different only with respect to 2 variables. Community B residents were more likely to be parents, and have larger households. Notably, ratings of violence in the communities were not significantly different, despite earlier studies showing Community B had more youth assaults. Although sample size might have influenced those other results, this nonsignificant finding cannot be attributed to low power, since average ratings for physical violence were essentially identical.

Conclusion

Community surveys can be of unique value and an inexpensive source of data on a range of issues, including residents' perceptions of problem severity and incidents that do not come to medical or legal attention. However, recruitment should be purposely planned, as measurement error may be introduced if not carefully evaluated. This study describes a process to introduce, implement, and evaluate recruitment strategies. Additional research could have public health implications in disadvantaged populations by helping to ensure representativeness of the samples.

Conflict of Interest

None of the authors identify a conflict of interest.

Disclosures

necessarily represent the official position of the Centers for Disease Control and Prevention. The study described in the manuscript was approved by the Committee on Human Studies (CHS) of the University of Hawaiʻi at Mānoa. In addition, the authors verify that this paper has not been previously published.

Acknowledgements

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