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## Validity of a Household Gun Question in a Telephone Survey

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### Synopsis .....

*The validity of self-reported data on the presence of guns in the home obtained in a telephone survey was assessed in samples of households where a*

*hunting license had been purchased or a handgun registered.*

*The survey was conducted among a random sample of Ingham County, MI, residents who had purchased a hunting license between April 1990 and March 1991 and among those registering a handgun during 1990. A third study sample was selected from the county's general adult population using a random digit dialing method. The interviews were conducted between November 1991 and January 1992.*

*The proportion of respondents who reported that at least one gun was kept in their household was 87.3 percent among handgun registration households and 89.7 percent among hunting license households. In the survey of the general population of the county, approximately one-third of the respondents reported keeping a gun in the household, 67 percent of them for hunting and 23 percent for safety.*

*Despite some limitations, the data indicate that a question on gun presence in a household can be used in a telephone survey.*

**G**UNS ARE INVOLVED in more than 33,000 deaths each year in the United States, second only to motor vehicles as a major cause of injury-related deaths (1). The age-adjusted rate of firearm-related mortality during 1991 in the United States was 15.2 deaths per 100,000 population; in Michigan it was 16.2 deaths per 100,000 (2).

In 1992, guns played a role in 3 of the 10 leading causes of death in both Michigan and the United States—accidents and adverse effects, suicide, and homicide (3). In Michigan in 1992, there were 728 firearm-related homicides, 597 firearm-related suicides, and 34 unintentional firearm-related deaths, according to the unpublished data of the Michigan Department of Public Health. Nationally, however, self-destructive use of guns claims more lives than either criminal assaults or accidents (4).

Household ownership of guns increased significantly through the 1960s and 1970s, as did the proportion of all suicides committed with guns (4). During this period, the number of females committing suicide using firearms more than doubled, and firearm suicides among children ages 5–19 years increased 299 percent (5).

Nationally, firearms are the fourth leading cause of unintentional injury deaths among children ages 5–14 years and the third leading cause among 15–24-year-olds (6). Most unintentional firearm-related deaths occur in or around the home, and most involve handguns (6).

Researchers at the Centers for Disease Control and Prevention of the Public Health Service predict that within a few years firearms will surpass motor vehicles as the leading cause of injury deaths (7).

According to a study by the U.S. General Accounting Office, one-quarter of the unintentional fatal injuries occur with the victim's own gun; another 20 percent with the gun of a parent, sibling, or other relative; and 12 percent with the gun of a friend or neighbor (8). Researchers also estimate that there are four to seven nonfatal injuries for every fatal unintentional shooting (9).

Since easy access to firearms is considered to be a risk factor for suicides (10), homicides in the home (11), and unintentional firearm-related injury and death (12), data on the presence of guns in the home are needed to guide public policy. To address this data need in Michigan, questions on gun presence and

storage practices were added to the 1992 Michigan Behavioral Risk Factor Survey (BRFS) of households.

## The Household Gun Question

Kellermann and coworkers conducted a landmark study validating responses to the question, "Are guns of any kind kept in your household?" in a face-to-face survey in Memphis, TN, and Seattle, WA (13). A sample of 75 names and addresses of people who had recently registered handguns was selected; people in 53 of these households were contacted, and those in 35 agreed to be interviewed. Of the 35 responses to the household gun question, 34 were considered valid, 31 responding in the affirmative and 3 reporting that previously there had been a gun in the household.

Prior to the inclusion of a series of questions on the presence, characteristics, and storage practices of guns in the home in the Michigan BRFS, a pilot study was conducted to validate within a telephone survey the same question that was used by Kellermann and colleagues (13), that is, "Are guns of any kind kept in your household?" Validation of this question was repeated because of the small sample used in the Kellermann study, the concern that the validity of this question might vary by region, and because of the inconsistency in the literature concerning the impact of the survey mode on the responses to sensitive questions.

In comparisons between the results from face-to-face surveys and those conducted by telephone, underreporting in telephone surveys has been observed for drug use (14), mental health symptoms (15), and unlawful union campaign practices (16). Other studies dealing with questions about alcohol (17,18), however, have not observed underreporting by telephone mode as compared with face-to-face. A review of surveys on physical abuse of women (19) found conflicting results concerning the possibility of a mode effect. The results of a meta-analysis covering a range of subject areas indicated a small tendency for higher social desirability effects in telephone versus face-to-face surveys (20). Aquilino has hypothesized that the inconsistency in mode effect may be related to the degree of threat associated with the question (14).

## Methods

Ingham County, MI, was selected as the study site. It is located in south central Michigan, includes the State capital of Lansing, and has a population of

approximately 281,900. Data from the 1990 census indicate that Ingham County, compared with the State as a whole, has a similar proportion of whites (84.1 percent versus 83.5 percent), but a slightly smaller proportion of African Americans (9.9 percent versus 13.9 percent) and a higher proportion of "other" racial groups (6.0 percent versus 2.6 percent). The age distribution of county residents is similar to the State's, with approximately 30 percent of the residents being younger than age 20 and approximately 60 percent ages 20–64. Ingham County has a higher proportion of urban residents than the State (86 percent versus 70 percent) and a higher proportion of residents who have graduated from college (29 percent versus 17 percent). The proportion of the population living below the poverty line, however, is somewhat higher in the county than in the State as a whole (16.6 percent versus 13.1 percent), and the average per capita income in Ingham County is slightly lower than the State average (\$13,740 versus \$14,154).

Despite these differences, Ingham County was thought to be similar enough to the State as a whole to make it an appropriate geographic area in which to conduct a study validating questions for use in the statewide BRFS.

Random samples were selected from two populations in Ingham County thought likely to have guns in their households—(a) people who had purchased a hunting license and (b) people who had registered a handgun. The samples were selected systematically from among those who had purchased a hunting license (which would allow hunting of deer, small game, and waterfowl) between April 1990 and March 1991 and among those who had registered a handgun during 1990.

To legally purchase and possess a handgun in Michigan, a person must be at least 18 years old and must first obtain a license to purchase signed by an authorized local law enforcement official. Within 10 days after purchase, the handgun must be presented to the local police agency to be registered and have a safety inspection certificate issued, at which point a copy of the registration is forwarded to the State police. This process allows the handgun to be kept in a home or business and allows for limited transportation. License to carry a concealed handgun is an entirely different process. A person must obtain a special license to carry a concealed handgun or to transport a handgun in a motor vehicle. Although a license is not required to purchase or possess long guns (that is, rifles and shotguns) in Michigan, they cannot be sold to anyone younger than age 18.

Telephone numbers were obtained by matching last

Table 1. Item nonresponse to household gun and income questions by three study samples, in percentages with 95 percent confidence interval (CI) limits, in Ingham County, MI, telephone survey

Samples	Gun presence <sup>1</sup>			Income <sup>2</sup>			
	Don't know	Refused	95 percent CI	Don't know	95 percent CI	Refused	95 percent CI
General population.....	0.0	5.7	(±4.0)	1.5	(±2.3)	11.7	(±6.8)
Likely ownership households <sup>3</sup> ...	0.0	8.3	(±3.9)	1.6	(±1.8)	8.3	(±3.9)
Handgun registrants.....	0.0	9.2	(±6.1)	0.0	...	10.3	(±6.4)
Hunting licensees.....	0.0	7.6	(±5.1)	2.9	(±3.2)	6.7	(±4.8)

<sup>1</sup>Nonresponses to the question, "Are guns of any kind kept in your household?"

<sup>2</sup>Nonresponses to the household income question, "Which of the following categories best describes your annual household income from all sources: less than \$10,000, \$10,000 to less than \$15,000, \$15,000 to less than \$20,000,

\$20,000 to less than \$25,000, \$25,000 to less than \$35,000, \$35,000 to \$50,000, or over \$50,000?"

<sup>3</sup>Combined sample of handgun registrant households and hunting licensee households.

Table 2. Percentages and 95 percent confidence interval (CI) limits of respondents from likely gun households who reported the presence of a gun in the home, overall and by age group<sup>1</sup>, Ingham County, MI, telephone survey

Samples	Age (in years) <sup>2</sup>							
	Total	95 percent CI	18-34	95 percent CI	35-54	95 percent CI	55 and older	95 percent CI
Likely gun households <sup>3</sup> .....	88.6	(±4.7)	79.7	(±10.3)	94.1	(±5.0)	90.6	(±10.2)
Hunting licensees.....	89.7	(±6.1)	84.4	(±12.6)	93.5	(±7.2)	89.5	(±13.8)
Handgun registrants.....	87.3	(±7.3)	74.1	(±16.6)	94.9	(±6.9)	92.3	(±15.5)

<sup>1</sup>Respondents who refused to answer the question were not included in this analysis.

<sup>2</sup>Age of respondent reflects the age of the oldest person in the household of

the same sex as the registrant or licensee.

<sup>3</sup>Combined sample of handgun registrant households and hunting licensee households.

names and addresses with telephone directory listings. All personal identifiers were then purged from the samples, except for sex as determined by first names. After matching, 188 telephone numbers were retained in the hunting license sample and 193 in the handgun registration sample. Within each household contacted, the oldest person of the same sex as the hunting licensee or gun registrant was selected to be interviewed. This intrahousehold selection procedure represented a compromise between interviewing the person most likely to know whether a gun was present in the household and the BRFSS method of using a household level question and maintaining anonymity of the respondent.

The third study sample was selected from the general adult population of Ingham County using a random digit dialing method. Within each household, the adult age 18 or older with the most recent birth date was selected to be interviewed.

Interviewing was conducted by telephone between November 1991 and January 1992. The same questionnaire was used with all three samples. Prior to the interview, respondents were assured that all responses were confidential and participation was voluntary. The introduction described the survey as a "survey of Ingham County residents' attitudes about safety in their community." Since one purpose of the survey

was to validate the household gun presence question, respondents were not told that the survey included questions on guns, nor were they informed that their telephone number had been obtained through a sample of hunting licensees or gun registrants.

The survey instrument contained 35 questions, beginning with eight about neighborhood crime and crime prevention. Following these introductory questions was the transitional statement and gun question—"Some people keep guns in their household. Are guns of any kind kept in your household?" After this filter question, additional questions were asked of respondents who answered yes, that is, questions about primary reason for the gun, number of guns in the household, types of guns, and storage practices. All respondents were then asked a set of four attitudinal questions about gun acquisition.

The data from the Ingham County general population survey were weighted by the number of adults in the household and a poststratification weighting factor reflecting the age-sex population structure of Ingham County. SUDAAN software was used to calculate the prevalence estimates and confidence intervals (21).

A subset of these same questions was included in the 1992 Michigan BRFSS. The survey protocol of the BRFSS was similar to that used in the general

population survey for Ingham County and is described elsewhere (22).

## Results

Eighty-seven completed interviews were obtained from handgun registrant households, 105 from hunting licensee households, and 148 from the general adult population. Telephone numbers in the samples that did not result in an interview can be accounted for by households and eligible respondents who could not be contacted, nonworking numbers, ineligible numbers (for example, business numbers, residences outside of Ingham County), and refusals. The unit (or participant) refusal rate, defined as the percent of all eligible respondents contacted who refused to be interviewed, was 23.7 percent among the handgun registrant sample, 26.9 percent among the hunting licensee sample, and 18.2 percent for the general population survey. The item refusal rate (that is, refusal to respond to "Are guns of any kind kept in your household?") was 9.2 percent among the handgun registrant sample, 7.6 percent among the hunting licensee sample, and 5.7 percent among the general population (table 1). Although the item refusal rate was slightly higher in the two samples likely to have guns than in the Ingham County general population sample, the differences were not statistically significant. None of the respondents reported that they did not know whether there was a gun in their household. For comparison, item refusal rates for the household income question are also presented.

The proportion of respondents who reported that guns were kept in their households was 87.3 percent of handgun registrant households and 89.7 percent of hunting licensee households (table 2). Approximately 11 percent of these two samples combined answered no to the household gun presence question. Among respondents from the likely gun households, there were no statistically significant associations (at the  $P = .05$  level with a  $\chi^2$ -test) in the proportion reporting no to the household gun presence question by household income (\$20,000 or less, more than \$20,000), education of the respondent (high school graduate or less, more than high school graduate), or age of respondent (18–34 years, 35–54 years, 55 years or older), although the test of the age variable approached the ( $P = .055$ ) level of significance.

Attitudes towards policies relating to gun ownership or increased regulation appeared to be similar among the likely gun household samples who responded yes to the household gun presence question and those who responded no or refused to answer, as measured by the proportion who either disagreed or

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strongly disagreed with four statements about gun ownership restrictions (table 3). Responses from the general population survey of Ingham County indicated a lower level of disagreement with three of these four attitudinal statements than the responses from the likely gun households.

Approximately one-third—34.7 percent ( $\pm 7.9$ )—of the Ingham County general population sample reported that a gun or guns were kept in their household. The primary reason given by the majority of respondents in Ingham County for keeping a gun in their household was hunting (66.8 percent), followed by safety (22.8 percent) (table 4). Thirty percent kept one gun in the household, 52.7 percent kept 2–4 guns, and 17.3 percent kept 5 or more guns. The majority (79.5 percent) kept long guns (rifles or shotguns or both) but no handguns, 5.9 percent kept handguns only, and 14.5 percent kept both handguns and long guns.

Hunting was reported as the primary reason for keeping a gun by the majority of likely gun households (90.6 percent of the hunting licensee sample; 50 percent of the handgun registrant sample). Ten out of the 60 handgun registrant sample respondents who reported the type of guns in the household also reported that only rifles or shotguns or both were kept in their household, reflecting a possible inconsistency.

## Discussion

The prevalence of guns in households was found to be lower in Ingham County, at 34.7 percent, than in the State as a whole, at 46.2 percent. This statewide prevalence was similar to the results of a Cable News Network-USA Today-Gallup poll in December 1993 that produced a national estimate of 49 percent (23). Results from Behavioral Risk Factor Surveys in other States indicate a generally similar prevalence of household gun presence; 40 percent of households in New Mexico reported having one or more guns in the home (24), as did 53 percent of households in Louisiana (25).

Table 3. Proportion of respondents who disagreed or strongly disagreed with four statements concerning restrictions to gun possession among the combined likely gun households (by response to household gun question) and among the Ingham County, MI, general population sample

Statement <sup>1</sup>	Likely gun households disagreeing with 4 statements						Ingham County sample disagreeing with 4 statements	
	Yes <sup>2</sup>		No-refused <sup>2</sup>		Total <sup>2</sup>		Percent	CI
	Percent	CI	Percent	CI	Percent	CI		
Criminal record check .....	4.5	(±3.3)	8.3	(±9.0)	5.2	(±3.2)	5.5	(±3.9)
2-week waiting period .....	39.7	(±7.7)	36.1	(±15.7)	39.1	(±6.9)	9.9	(±5.3)
Handgun ban .....	92.3	(±4.2)	82.4	(±12.8)	90.5	(±4.2)	56.8	(±9.4)
Require safety course .....	22.6	(±6.6)	19.4	(±13.0)	22.0	(±5.9)	5.0	(±3.1)

<sup>1</sup> Respondents were read the following instructions: "Next I will read four separate statements and then ask whether you strongly agree, agree, disagree, or strongly disagree." 1. "Everyone buying a gun should be checked to see if they have a prior criminal record." 2. "There should be a 2-week waiting period for

anyone purchasing a gun." 3. "Handguns should be banned." 4. "Everyone buying a firearm should be required to attend a gun safety course."

<sup>2</sup> Response to the question, "Are guns of any kind kept in your household?"

Table 4. Gun characteristics and reasons for gun ownership reported by likely gun sample, Ingham County, MI, general population sample, and statewide 1992 Michigan Behavioral Risk Factor Survey (BRFS)

Characteristics	Likely gun samples						General populations			
	Handgun <sup>1</sup>	95 percent CI	Hunting <sup>2</sup>	95 percent CI	Combined <sup>3</sup>	95 percent CI	Ingham <sup>4</sup>	95 percent CI	BRFS <sup>5</sup>	95 percent CI
Primary reason for gun:										
Safety .....	18.2	(±9.3)	4.7	(±4.5)	10.6	(±4.9)	22.8	(±17.1)	18.6	(±2.8)
Hunting .....	50.0	(±12.1)	90.6	(±6.2)	72.8	(±7.1)	66.8	(±17.5)	61.4	(±3.4)
Other .....	31.8	(±11.3)	4.7	(±4.5)	16.6	(±5.9)	10.4	(±12.5)	20.0	(±2.6)
Number of guns:										
1 .....	20.5	(±11.9)	6.8	(±5.7)	11.9	(±5.8)	30.0	(±17.0)	26.9	(±3.2)
2-5 .....	27.3	(±13.2)	55.4	(±11.4)	44.9	(±9.0)	52.7	(±17.1)	44.8	(±3.4)
6 or more .....	52.3	(±14.8)	37.8	(±11.1)	43.2	(±9.0)	17.3	(±10.2)	28.2	(±3.3)
Type of gun:										
Handguns .....	15.0	(±9.1)	0.0	...	6.4	(±4.1)	5.9	(±9.4)	10.0	(±2.1)
Rifles, shotguns .....	16.7	(±9.5)	76.3	(±9.3)	50.7	(±8.3)	79.5	(±14.5)	60.3	(±3.4)
Both .....	68.3	(±11.8)	23.8	(±9.3)	42.9	(±8.2)	14.5	(±13.3)	29.7	(±3.1)

<sup>1</sup> 79 responses to household gun question; 87.3 percent (±7.3) reported that guns were kept in their household.

<sup>2</sup> 97 responses to household gun question; 89.7 percent (±6.1) reported that guns were kept in their household.

<sup>3</sup> 176 responses to household gun question; 88.6 percent (±4.7) reported that

guns were kept in their household.

<sup>4</sup> 140 responses to household gun question; 34.7 percent (±7.9) reported that guns were kept in their household.

<sup>5</sup> 2,365 responses to household gun question; 46.2 percent (±2.4) reported that guns were kept in their household.

Primary reason for the gun presence in the household appeared to be similar in Ingham County and the State as a whole. There did appear, however, to be a higher proportion of households with only long guns in Ingham County compared with the State. Among the combined likely gun households, the reason for gun presence was similar to the results from the statewide and county-level population samples. A higher proportion of likely gun households, however, kept five or more guns, and a higher proportion kept both handguns and long guns.

Since the respondents were not told during the introduction to the survey that questions about guns were included, the unit refusal rate reflects a general unwillingness to participate in a survey concerned with attitudes about safety in the community rather than an unwillingness to answer questions about guns. Although higher than optimal, these refusal

rates fall within the range of refusal rates in telephone surveys of the general population, which Dillman and coworkers note range from 9 to 36 percent (26), and Steeh (27) has concluded are tending to increase. Item refusal rates do, however, reflect an unwillingness to answer questions specifically about guns. Among the likely gun households, the item refusal rate for the household gun question was similar to the rate for the income question, which is also thought to be sensitive (28). Among the general population of Ingham County, the lower item refusal rate for the gun presence question compared with the item refusal rate for the income question (although the difference was not statistically significant) was hypothesized to reflect the possibility that the gun presence question may be sensitive only among those who do have a gun in their household.

If it can be assumed that all of the people who

purchased a hunting license owned a gun and that all of the persons who registered a handgun were still in possession of the handgun and kept it in their household, then 11.4 percent of the responses were invalid and would result in an underreporting of household gun presence. These validation results, however, cannot be generalized to the general population. They relate only to those households in which someone purchased a handgun through the legal registration process in Michigan and those households in which someone had purchased a hunting license. It could be hypothesized that persons who acquire handguns through an illegal process might be less likely to report the presence of a gun in their household in a telephone interview. Data to this effect are not available, however, and it would be difficult to attempt a validation study among this group.

There were several limitations to this study. The likely ownership samples were limited to those listed in the telephone directory. Studies have indicated that people living in households with unlisted telephone numbers may tend to have different characteristics such as being younger, having less education, and more likely to be divorced (29). A second limitation, also related to the survey methodology, is the noncoverage of households that do not have telephones, which is a limitation of the survey mode itself. In Michigan as a whole, only 4.1 percent of households do not have a phone. In Ingham County, 3.6 percent of households do not have one. Telephone noncoverage is not evenly distributed across socioeconomic groups, however, with education and income being two of the most important correlates; telephone noncoverage is highest among those with lower educational status and income (30). The State health department's unpublished results from the 1992 Michigan BRFSS indicate that households with lower income report a lower prevalence of household gun presence, which in combination with the undercoverage among households with lower income could tend to overestimate household gun presence. However, results from this study do not indicate that the validity of responses is related to household income.

If a gun was owned by a household member but kept outside the household, "no" would have, in fact, been a valid response to the household gun presence question. A question about keeping a gun outside of the household was not asked in this study. However, in the CNN-USA Today-Gallup national poll, 1.7 percent of the total respondents reported to have a gun on their property but not in their home (23). Two other possibilities where "no" would have been a valid response are that some of those who

*'Within the context of the limitations . . . it appears that the household gun question is relatively valid in a telephone survey mode among registered handgun owners and hunting licensees.'*

purchased a hunting license may not have owned a gun and some of those who registered a handgun may no longer have been in possession of it at the time of the interview. Nearly 9 percent of the handgun registrant households interviewed by Kellermann and coworkers (13) reported that, although guns were not currently kept in the household, guns had recently been kept in their homes. This was considered to be a valid response in the Kellermann study. All three of these scenarios might tend to inflate the estimate of the underreporting of gun presence from this study.

Another potential limitation of this study is that the word gun in the household gun presence question might not have been interpreted as the developers of this questionnaire intended, that is, as a powder firearm, since a definition of the word was not given. It appears unlikely, however, that gun was interpreted by respondents to mean a toy gun or a pellet or BB gun. Oral responses to the question "What is the primary reason that there is a gun in your household?" were recorded for those responses that fell into the precoded "other" category. An examination of these responses did not reveal any indication that the gun to which the respondent was referring was not a powder firearm.

An interesting inconsistency that arose from these data was the 16.7 percent of the handgun registrant sample that reported they did have guns in the household then subsequently reported that they had no handguns. Again, a valid scenario might be that truly the handgun was no longer kept in the household, or it might conceivably indicate the possibility of an underreporting of handgun as the type of gun in the household.

Within the context of the limitations discussed previously, it appears that the household gun question is relatively valid in a telephone survey mode among registered handgun owners and hunting licensees. In comparison with the results from Kellermann and coworkers' face-to-face validation (13), however, the results from this study do indicate that a mode effect may exist for this household gun presence question, although the magnitude of the mode's effect cannot be estimated.

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