

Analyzing the Effectiveness of a Non-Verbal Response Card: Evidence from Ethiopia

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Abstract

We present the results from a test of a new response method for use with sensitive questions in the context of a face-to-face interviewer administered questionnaire. The non-verbal response card that we develop offers a simple, low-tech alternative to computer-assisted self-interviews for use in low income rural settings where illiteracy is common. We tested this new method in a survey of 1,268 randomly sampled adolescents age 13-24 in a rural zone of Ethiopia. A comparison of responses to sensitive questions regarding sexual attitudes, knowledge and behavior reveal significant differences in response patterns between a control group that provided verbal responses and an experimental group that used the card. These results suggest that conventional face-to-face interviewer administered surveys may in selective populations provide seriously biased estimates of adolescent sexual behavior and attitudes regarding contraception and sexual behavior.

Extended Abstract

Survey researchers have long known that in interviewer-administered surveys, respondents often intentionally misreport their behavior or attitudes in order to create a more favorable image of themselves in the eyes of the interviewer, or to avoid creating an awkward interaction. Reporting bias is therefore a particularly critical issue as survey research focuses increased attention on sensitive topics, such as sexual risk taking, illicit substance use, domestic violence, and attitudes regarding sexual behavior, racial preferences, and discrimination. A number of innovations in survey methodology have been developed to address reporting bias, including strategies to increase the level of respondent privacy and confidentiality while preserving the advantages of having an interviewer present. These innovations typically involve some level of respondent self-administration for the sensitive portion of the interview. In this paper we will examine the effectiveness of a new non-verbal response method for soliciting responses to sensitive questions. This method was recently piloted by the investigators in a survey of adolescents and young adults in southwestern Ethiopia. Preliminary findings from the survey indicate significant differences by response method in reports of sexual experiences, knowledge and attitudes.

Background

Demographic research in developing nations has long been concerned with survey measurement and analysis of a variety of potentially sensitive issues and behaviors such as sex before marriage or outside of marriage, unprotected intercourse, family influences on marriage and spouse selection, substance use, abortion, family violence, and the autonomy of women in household decision-making. Although there is a general recognition that responses to survey questions on these topics may be inaccurately reported, nearly all research on reporting errors in developing country surveys has focused on issues dealing with non-response (Gibson, Hudes, Donovan 1999; Mishra et al 2006) or the temporal compression or telescoping of events (Gage 1995). Much less attention has been given to the accuracy of survey responses to sensitive items in interviewer-administered population surveys.

In face-to-face interviewer-administered surveys, non-response and intentional misreporting are common response effects with questions that address sensitive topics. The refusal to participate in a survey interview (unit non-response) or to respond to individual questions (item non-response) can bias survey results. A potentially worse situation arises when subjects intentionally misreport their behavior or opinions rather than refuse to answer, because they feel socially obligated to cooperate, or because they wish to make a positive impression on the interviewer. Systematic misreporting on sensitive topics generally takes the form of underreporting socially undesirable behaviors or attitudes and overreporting desirable ones. This type of misreporting is more problematic from a data quality perspective than non-responses because it is not easily detected and can bias sample estimates.

Tourangeau, Rips and Rasinski (2000) identify *social desirability*, *invasion of privacy*, and *risk of disclosure* as three dimensions of sensitive questions that generate reporting bias. Social desirability refers to the tendency of respondents to report behaviors or attitudes that project a favorable image of themselves and do not offend the interviewer or elicit the

interviewer's disapproval (Johnson and Van de Vijver 2003). Social desirability stems from an individual's need for social approval, as well as to conform to perceived cultural norms of good behavior and cooperation, and to avoid embarrassment and shame. Johnson and Van de Vijver (2003) find systematic cross-cultural differences in the response effects of social desirability, with lower levels of social desirability bias associated with higher levels of affluence and social power. For example, in the United States, minority groups are more likely to underreport stigmatizing behaviors such as substance abuse and abortions than majority whites (Jones and Forest 1992). Social desirability bias is particularly likely in developing nations, where cultural norms of behavior are well-established, are reinforced by religious institutions, and daily life is subject to strict family control (especially in strongly patriarchal and extended families). Research also indicates that respondents are more comfortable reporting stigmatizing behaviors and attitudes when the gender and race of the interviewer is the same as the respondent (Cotter, Cohen and Coulter 1982; Anderson, Silver and Abramson 1988; Finkel, Guterbock and Borg 1991; Davis 1997). On the other hand, respondents are more likely to report positive attitudes toward a group when they are interviewed by a member of that group (Johnson and Van de Vijver 2003). This situation is likely to arise in developing nations where interviewers are often more educated than respondents, and may be of a different ethnic and linguistic group (for example, interviews that are conducted in the "national" language of the dominant group rather than in the local dialect).

Because social desirability is based on the respondent's assessment of the degree of sensitivity of a question and how the interviewer will judge a particular response, the relative magnitude and direction of response effects in face-to-face interviews will vary, often in predictable ways, across questions, response modes, individuals, social groups and cultures. These issues are particularly salient for survey research on sexual behavior and reproductive health (see Axinn 1991; Bearinger et al. 2007; Marston and King 2006; Puri and Busza 2004; Zehener 1970). For example, Muslims are less likely to admit to sexual activities outside of marriage than Christians. The double standard in norms of sexual behavior for men and women produces a tendency for women to underreport the number of sexual partners and for men to overreport the number of partners (Smith 1992). More educated persons and those living in cities typically are less inhibited in reporting non-normative behaviors. But while the direction of bias typically can be predicted, the magnitude of the bias is often a matter of conjecture; this prevents the accurate description of sexual and other sensitive attitudes and behaviors at the population level, exaggerates social and economic differences in reported sexual behaviors, and limits the ability of researchers to adjust for unreliability in the measurement of causal relationships.

Privacy issues are a second dimension of sensitive questions that generate response effects in interviewer-administered surveys. Sensitive questions, particularly those dealing with intimate sexual behaviors, may be viewed as intrusive. Investigators count on the impersonal and scientific nature of the survey interview to reduce the awkwardness associated with questions about private matters. Similar to social desirability, concepts of privacy and intrusive questioning will vary cross-culturally and by social group. In cultures that emphasize collectivism and cooperation in social interaction, the need to maintain positive and harmonious relations with the interviewer can contribute to biased results if respondents react to intrusive questions by providing inaccurate responses (Johnson and Van de Vijver 2003; Jones 1983). For instance, in Ethiopia, refusal rates for surveys are exceptionally low compared to surveys in higher income

countries, in part because of the strong cultural emphasis on politeness and conformity. These high response rates, however, may mask intentional misreporting by respondents who might otherwise refuse to answer.

A third dimension of sensitive questions is the risk of disclosure. Respondents may refuse to answer a sensitive question or intentionally misreport a behavior or attitude because of concerns that others will hear the questions and responses during the course of the interview. This is especially likely in rural villages, where privacy is typically not possible and interviews may occur with other family members and individuals present or within listening range. There also may be a concern that interviewers who learn embarrassing responses will reveal those responses to others, especially when the interviewers are recruited locally from the same ethnic, linguistic and religious group. Concerns about social desirability bias, invasion of privacy, and risk of disclosure are particularly salient when studying adolescent sexual and reproductive health (Bearinger et al 2007). Cross-cultural studies indicate that issues related to sex, pregnancy, and contraceptive use are highly stigmatized among youth and that youth communication about these topics is very limited.

The mode of data collection has a major influence on the response effect with sensitive questions. Studies are very clear that some form of self-administration in the sensitive section of a questionnaire reduces the level of misreporting. Likewise, research indicates that the impact of self-administration is negligible with non-sensitive questions (Tourangeau, Rips and Rasinski 2000). For example, the proportion of respondents who report illicit drug use is much higher in self-administered questionnaires than interviewer-administered questionnaires (Tourangeau, Rips and Rasinski 2000:270). In the case of desirable behaviors, Presser and Stinson (1998) found that reported attendance at religious services was lower in self-administered compared to interviewer-administered questionnaires. Despite the problems of non-response and misreporting, the advantages offered by the presence of an interviewer (i.e., higher overall participation rates, question clarification, fewer invalid responses, and direct observation) generally outweigh the potential drawbacks. A number of innovations in questionnaire administration and response modes that are designed to reduce the response effects produced by sensitive questions have been introduced for use in face-to-face interviews. In computer-assisted self-interviewing (CASI), questions are displayed on a computer screen and responses are entered using the keyboard. Simultaneous verbal instructions may be provided by the interviewer or played through earphones (audio computer-assisted self-interviewing, ACASI) to guide the respondent. An alternative method for collecting sensitive survey data is to provide the respondent with a self-administered paper and pencil questionnaire that the respondent places in a sealed envelope upon completion. Tourangeau and Smith (1996) found that the gap in the number of sexual partners reported by men and women in interviewer-administered questionnaires was sharply reduced, when computer-assisted self-administration was used.

Both the computer-assisted and paper and pencil methods place cognitive burdens on the respondent that make them less appropriate in developing nation populations. The paper and pencil method requires more than basic literacy, and computer assisted methods, even when the questions are read to the respondent aloud or on audio, require basic familiarity with a keyboard and character and number recognition. In our study setting in southwestern Ethiopia, literacy is limited, familiarity with computers is rare, and a unique non-Latin script is used for the national

language (Amharic); therefore, the paper and pencil and computer-assisted modes of self-administration or response will not work.

A new methodology is needed to obtain unbiased responses to sensitive survey items in demographic research in developing nation populations. The need is particularly important for population surveys in developing nations in which there is a large tendency for individuals to misreport sensitive information. We address this gap through a new non-verbal response card. The non-verbal response card addresses the three dimensions of sensitive questions (social desirability, invasion of privacy, and risk of disclosure) that generate response effects in face-to-face interviewer-administered questionnaires; it places minimal cognitive demands on the respondent; it is highly portable, very inexpensive, and adaptable to a wide variety of subject matter and response options. To the extent that this methodology is proven useful for improving the accuracy of reports of sensitive behaviors in the Ethiopian context, it has potential for widespread use in other developing and low-literacy settings, as well as broader application to the study of risky behaviors, sexual knowledge, social attitudes, racial preferences, and other topics where the provision of socially desirable responses is a concern (Marston and King 2006).

Data and Methods

The Gilgel Gibe Social and Sexual Relationship History Survey was conducted in May-June, 2006 by Brown University and Jimma University (a large regional university in southwestern Ethiopia). The Gilgel Gibe study site encompasses rural and semi-urban communities surrounding a reservoir recently created by a new hydroelectric dam. The Gilgel Gibe area is 6 hours driving time to the southwest of Addis Ababa, and has a population of approximately 45,000. Highway construction and the dam project have brought an influx of construction workers into the area, activities which have raised local public health concerns about increased prostitution and the spread of STDs. The Gilgel Gibe survey randomly selected 1,200 adolescents and young adults age 13-24 from household registries that were compiled in a 2005 baseline survey of 8,900 households for a demographic surveillance system implemented by investigators from Jimma University.

The adolescent and young adult respondents were interviewed at home, but in a location in the residence or residential compound where they were alone. Female interviewers were used with female respondents and male interviewers with male respondents. The interviewers were fully conversant in the two dominant local languages (Amharic and Oromifa), and versions of the questionnaire were prepared in both languages. The questionnaire collected information on the last four romantic relationships that respondents had, including information on the background characteristics of each partner and the nature of intimate physical and sexual contact between the two. Respondents were also asked about the conditions under which first sexual intercourse occurred, knowledge and use of condoms, perceptions of HIV risk, and attitudes regarding the appropriateness of premarital sex. Data entry was conducted using a double-entry system to ensure maximum accuracy.

To address the issue of reporting bias, we developed an innovative response method which we call the “non-verbal response card method.” Our new method uses a response card that allows the respondent to non-verbally and confidentially communicate responses to questions

read by the interviewer. The response card is an $8\frac{1}{2} \times 11$ laminated sheet of heavy stock paper with a respondent side and an interviewer side. Each side is divided into 35 cells (5 rows and 7 columns) with a small hole punched through the center of each cell. On the respondent side of the card, the cells contain written and color coded responses (see Figure 1 below). The numeric responses range from 0 to 25 (for the number of sexual partners and age at first sex), the non-numeric responses are “Yes”, “No”, and “does not apply”. The numeric responses are indicated by both a written number and vertical bars (for example, || for 2, and ||||| ||||| for 10). The non-numeric responses are written in the two local languages and are color coded, green for “Yes”, red for “No” and blue for “does not apply”. On the interviewer side of the card, each cell contains a unique three-digit number. The number of cells and response options provided on the card are survey specific, and can vary across questionnaires or question sets within questionnaires, permitting the card’s use for a variety of topics and study populations.

The card is held by the respondent with the respondent side visible only to the respondent and the interviewer side visible only to the interviewer. The respondent indicates his/her response to a question by inserting the point of a stick that is provided through the hole in the appropriate response cell. The interviewer records the three digit number in the cell on the interviewer side of the card through which the point of the stick is protruding. To ensure that the interviewer does not recognize a response based on the position of the response cell, a total of 20 response cards were prepared in which the order of the responses on each card varies (but the response set remains the same), and the three digit number assigned to each response is different. There are also multiple “Yes”, “No”, and “does not apply” response cells on each card so that the respondent is not repeatedly using the same cell for “Yes” or “No” on any single card.

The three digit numbers are randomly assigned to the 35 possible responses with a total of 20 unique numbers (corresponding to each of the 20 cards) assigned to each response. The three digit numeric codes are recoded to their corresponding response after the data have been entered into computer files. The 20 response cards are divided into two sets of ten cards each, an “A” set and a “B” set. On a given day an interviewer is provided an “A” or a “B” set. At the start of the sensitive section of the questionnaire, the interviewer presents the respondent with an envelope with 10 response cards inside. The respondent is instructed to pull out the cards and inspect them while the interviewer explains how to use the cards and how the cards are designed to preserve the confidentiality of the respondent’s responses. The interviewer uses a demonstration card that has only two rows of cells with examples of the numeric and non-numeric response cells. The interviewer uses the demonstration card to show the respondent how the card is used, and to remind the respondent throughout the course of the interview that green is for “Yes”, red is for “No”, and blue is for “does not apply”. The respondent is instructed to hold onto any one of the cards and to set the other cards down. At any point during the interview the respondent can change cards if he/she wishes. At the end of the sensitive portion of the interview, the respondent is instructed to place all of the response cards back into the envelope in any order.

Figure 1. Non-Verbal Response Card

(a) Side Facing Interviewer							(b) Side Facing Respondent						
963 •	238 •	631 •	842 •	479 •	420 •	292 •	13 • 	14 • 	15 • 	16 • 	17 • 	18 • 	19 •
938 •	105 •	669 •	351 •	691 •	675 •	888 •	20 • 	21 • 	22 • 	23 • 	24 • 	25 • 	•
539 •	634 •	988 •	410 •	192 •	881 •	561 •	ለዎ • Eeyyee	የለሎ • Lakki	•	0 •	1 • 	2 • 	3 •
467 •	889 •	912 •	632 •	359 •	745 •	433 •	4 • 	5 • 	6 • 	7 • 	8 • 	9 • 	•
743 •	317 •	705 •	898 •	590 •	986 •	871 •	10 • 	11 • 	12 • 	•	•	ለዎ • Eeyyee	የለሎ • Lakki

(Note: • represents hole in the card for response stick; cells on the respondent side with • alone are colored blue and are used for “does not apply” (e.g., age at first sex for respondents who have never had first sex); cells with the word “Eeyyee” are colored green and are used for “Yes”; cells with the word “Lakki” are colored red and are used for “No”; the valid range of numeric responses for the questions was 0-25 and was specific to the survey questionnaire for which the cards were tested and used. There are a total of 20 distinct cards, each of which has the same response set, but in a different order on the card and with a different set of unique three digit codes.)

The number of response options on a single card can be reduced to lessen the cognitive demands on the respondent, and a variety of different card types can be used during the course of an interview for different response sets (e.g., Yes/No, ordinal rankings, numeric responses). The card method does not require the respondent to be literate, although it does require basic numeracy. The low-tech and lightweight nature of the cards makes them ideal for use in rural areas in low-income countries.

Because the interviewer does not know the interviewee’s response, the social desirability motive for misreporting is greatly reduced and is limited to those respondents who regardless of the mode of question administration or response do not believe their responses are confidential. The awkwardness created by intrusive questions is reduced because the respondent does not provide a verbal response. Equally important, if the respondent is truly offended by the question and does not want to respond, he/she can provide a non-valid response without the knowledge of the interviewer, and thus remain courteous and cooperative during the interview in accordance with social norms. Invalid responses (such as a numeric response for a Yes/No question) can be screened out at the time of data processing, which is preferable to having a valid but intentionally misreported response. Respondent concerns about the risk of disclosure during the course of the interview are also reduced by the response card. Not only does the interviewer not know the interviewee’s response, nor does anyone else within listening range. This feature of the card is especially important in interviews in crowded settings where privacy is difficult to achieve, and

also particularly with youth, women, and girls in low-income settings where cultural norms prohibit young people and particularly girls from being completely alone with strangers.

The survey questionnaire and non-verbal response cards were first pre-tested with 200 randomly selected adolescents in a rural area adjacent to the Gilgel Gibe study area. The interviewers received one week of intensive training prior to the pre-test, and then another one week of training prior to interviewing using the final version. The interviewers quickly grasped the concept and use of the cards, and reported a similar outcome among the respondents in the pre-test. The non-verbal response cards were randomly assigned to half of the full study sample of 1,268 in advance of interviewing. Interviewers were required to use the response cards for the sensitive portion of the questionnaire with the youth who were assigned the card method (experimental group), and they were required to use the conventional verbal response method with the remaining half of the sample (control group). The sensitive portion of the survey included 50 questions on sexual behavior, knowledge and attitudes. Two separate questionnaires were prepared for the card group and the verbal response group. The questionnaire for use with the cards included instructions to be read by the interviewer on how to use the card for on each question. It did not include any skip instructions for the sensitive portion of the questionnaire because the interviewer does not know the interviewee's responses to earlier questions. The questionnaire used with the verbal responses included skip patterns for questions that were not applicable based on earlier responses. In all other respects the two questionnaires were identical. Each interviewer conducted interviews using the cards and using the verbal response method. This randomized control trial design provides the data needed to assess the effectiveness of the response cards in reducing reporting bias for the respondents overall and for key subgroups in the population.

Prior research on respondent behavior and survey reporting bias suggests that potentially stigmatizing or undesirable behaviors will be underreported and attitudes or beliefs that the respondent perceives as normative for the interviewer will be overreported in face-to-face interviewer-administered survey questionnaires. To the extent that the non-verbal response card method reduces bias in the reporting of sensitive information we expected that:

- (1) Reports of stigmatizing or undesirable behaviors or experiences will be more prevalent among respondents who use the card method than among respondents who give verbal responses. For example, reports of premarital sex and coercive or involuntary first sex will be more common among respondents who use the card method compared to the verbal method.
- (2) Reports of more permissive sexual attitudes and knowledge (which are consistent with the normative expectations of the better educated interviewers) will be more common among respondents who give verbal responses compared to respondents who use the card method.
- (3) The impact of the response mode on response patterns will be greatest for the most stigmatized behaviors and attitudes, and will vary across subgroups according to the level of stigma that the group attaches to the behavior or attitude. For example, the impact of response mode on reports of premarital sex will be greater for girls than for boys. We also anticipate that the effect of response mode among boys will be most prominent for questions that tap into boys' sophistication or "manhood."

Table 1 presents the responses to a selection of questions on sexual experience, conditions of first sex, knowledge of where to obtain condoms, and attitudes regarding the

acceptability of premarital sexual intercourse for women by response mode from the Gilgel Gibe survey. The table includes non-valid responses, which can result from interviewer and data entry error in the case of both response modes, and intentional or unintentional response error by respondents using the cards (e.g., pointing to a numerical response cell for a Yes/No question). Consistent with the predominantly Muslim and rural character of the study area, the reported prevalence of sexual intercourse among never married girls and boys is very low, but increases with age. In both the 13-17 and the 18-24 age groups, the reported prevalence of premarital sex is higher among youth who used the response card compared to the verbal method. The differences in prevalence of reported premarital sexual intercourse by response method are greatest among the youngest respondents and surprisingly, among boys. Responses to questions about the conditions under which first sex occurred among all respondents who have ever had first sex (married and never married), also vary substantially by response mode. The willingness to report that first sex occurred under pressure from a partner or friends, rape, or in exchange for money, grades or some other gain is much higher among boys and girls who used the card method. Among boys, for whom admitting that first sex occurred under some form of coercion is more shameful, the prevalence of coercive first sex is 2.6 times as great among respondents who used the cards compared to the verbal method. On the other hand, reports that first sex was motivated by love or sexual desire are more common among verbal respondents than among card respondents.

In addition to a desire to not report potentially embarrassing sexual experiences, youth are also hesitant to reveal ignorance about certain forms of sexual knowledge and to express attitudes that may seem traditional or “backward”. For instance, reported knowledge of where condoms can be obtained is more common among youth in towns than among rural youth, and within each group reported knowledge is greater among respondents who gave a verbal response than among respondents who used the card. The impact of response mode also varies for questions regarding the acceptability of premarital sex by gender values. Overall, respondents who used the verbal response method express more accepting attitudes toward premarital sex than respondents who used the card method, but among respondents who express egalitarian gender values, the difference in reported approval of premarital sex by response mode is particularly great. These selective preliminary results suggest that in face-to-face interviewer-administered surveys adolescent respondents in the Gilgel Gibe area are less likely to report stigmatized behaviors and more likely to report sexual knowledge and attitudes that are associated with modern lifestyles. When provided a more confidential method for responding to the same questions, adolescents appear to be more likely to report stigmatized behaviors, lack of sexual knowledge, and more conservative attitudes. The results of this study have important implications for how we solicit responses to sensitive questions, as well as questions that address types of knowledge and attitudes that are associated with less traditional or more modern life styles.

Table 1. Response Effects from 2006 Gilgel Gibe Social and Sexual Relationship History Survey, Verbal and Card Responses, Youth Age 13-24, Ethiopia.							
		Never married youth					
		Girls			Boys		
		Verbal %	Card %	Card% / Verbal %	Verbal %	Card %	Card%/ Verbal%
Have you ever had sexual intercourse?							
Age 13-17	Yes	2.9	5.1	1.76	1.0	2.6	2.60
	No	94.7	90.4		99.0	90.4	
	Non-valid response	2.4	4.5			7.0	
Number of cases		(164)	(154)		(207)	(189)	
Age 18-24	Yes	16.7	17.9	1.07	9.9	13.9	1.40
	No	83.3	75.0		89.0	83.2	
	Non-valid response		7.1		1.1	2.9	
Number of cases		(30)	(28)		(91)	(101)	
Youth who have had first sexual intercourse							
The first time you had sexual intercourse, did you do it because: You were pressured by partner, friends, raped, for money or other gain.		Girls			Boys		
Yes		14.7	25.2	1.71	13.9	35.6	2.56
No		85.3	73.9		86.1	64.4	
Non-valid response			0.9				
To show partner love, experience sex, for pleasure.							
Yes		34.9	28.8	0.85	72.2	62.2	0.86
No		65.1	70.3		27.8	37.8	
Non-valid response			0.9				
Number of cases		(129)	(111)		(36)	(45)	
Total sample							
Do you know where you can obtain condoms?		Urban			Rural		
Yes		72.2	56.1	0.78	31.1	22.6	0.73
No		27.3	42.8		67.6	73.8	
Non-valid response		0.5	1.1		1.3	3.6	
Number of cases		(187)	(196)		(446)	(443)	
Total sample							
It is acceptable for a woman to have sex with a man when she is engaged to be married to him.		Egalitarian gender values*			Traditional gender values*		
Yes		55.3	38.1	0.69	47.5	41.6	0.88
No		44.7	58.2		52.3	56.4	
Non-valid response			3.7		0.2	2.0	
Number of cases		(188)	(189)		(444)	(447)	
*Youth with egalitarian gender values score in the top 30 th percentile of an egalitarian gender relations index that we constructed from responses to six questions on gender relations, and youth with traditional values score below the top 30 th percentile on the index.							

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