Limited benefit of repeating a sensitive question in a cross-sectional sexual health study

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Abstract

Background: Sexual health research relies heavily on self-reported data. We explored whether repeating a key measure – number of lifetime sexual partners – improved the validity of this self-reported response.

Methods: Using data from a study of Tanzanian plantation residents, we examined which of 505 participants changed their responses when a question about sexual partners was repeated. We examined which variable (first, second, or maximum response) was more predictive of herpes simplex virus type 2 (HSV-2) seropositivity, a biomarker strongly associated with number of lifetime partners. HSV-2 status was assessed using the HerpeSelect 2 ELISA IgG test.

Results: When asked a second time, 10.7% of participants increased and 3.6% decreased their reported number of partners. Participants using audio computer-assisted self-interviews were more likely to change than those interviewed in person (p = 0.006). The increased odds of HSV-2 seropositivity with each additional partner ranged from 10% to 13% in men, and 33% to 37% in women, depending on which partner variable was used. Estimates had considerable confidence interval overlap and no substantial differences in precision.

Conclusions: Some participants change their responses when asked a sensitive question a second time, but in this population, changes did not meaningfully affect associations between lifetime partners and HSV-2.

Keywords: Sensitive behavior, ACASI, Sexually transmitted disease, Tanzania
agricultural plantation influences sexual behavior and risks for several sexually transmitted infections (STIs), including HIV, syphilis and HSV-2 [6]. The parent study enrolled agricultural plantation residents aged 18 years or older, who were able to give consent, and were randomly selected or volunteered in person at the study site [6]. The team used a mobile research unit to administer a questionnaire and conduct STI/HIV testing. A total of 556 participants completed detailed questionnaires; of these, 505 had complete data on number of sexual partners; 513 provided biological specimens for HSV-2 testing; and 410 had both complete questionnaire and HSV-2 data.

The survey was administered in Swahili. Many sensitive topics were addressed, and thus ACASI was utilized in an attempt to increase honesty in participant responses. Each participant heard the questions in a gender-matched voice. Most participants (82.0%) completed the ACASI survey independently, although individuals with limited literacy or inability to use the computer (16.0%) were assisted by a gender-matched interviewer who entered participants’ responses on the computer. Mode of administration was missing for 2.0%; these respondents are excluded from multivariate models.

Correct information on participants’ lifetime number of sexual partners was thought to be of central importance to the study. Thus, in addition to the efforts described above to increase honest self-report, we asked about lifetime number of sexual partners two times, with the second question following immediately after the first question, prefaced with an explanation about the importance of the participants’ honest response. The survey included the following two questions, modified so respondents could be questioned a second time (Table 1). Among those who answered Q1 and then selected or volunteered in person at the study site [6]. The Ohio State University Institutional Review Board determined that these secondary analyses were exempt from further review.

Results
Changes in responses
Among 505 individuals (250 men and 255 women) with valid sexual partner data, 85.7% did not change their reported number of lifetime sex partners when questioned a second time (Table 1). Among those who
did change, 10.7% increased and 3.6% decreased the number of partners. Only mode of survey administration was associated with changing responses ($p = 0.006$, Table 1). Participants using ACASI were significantly more likely to change their responses than those assisted by an interviewer ($n = 81$, 16.0% of the study population). HSV-2-seropositivity was marginally associated with changing answers ($p = 0.073$, Table 1).

Number of partners and HSV-2
Among the 410 individuals with both valid questionnaire and HSV-2 data, the odds of HSV-2 seropositivity increased with increasing lifetime sexual partners (Figure 1). Because the differences between men and women were determined to be statistically meaningful based on AIC, we examined associations separately for men and women in all subsequent analyses.

We examined ROC curves showing various cut-points for binary classification of HSV-2 positivity, using the response to Q1 alone and the response using the larger of Q1 and Q2, separately by sex (Figure 2). Using the larger of the two responses as the classifier netted as many or more cases (true positives) as well as non-cases (false positives), shifting the ROC curve overall upward and to the right and thus marginally increasing the area under the curve.

Multivariable modeling
When Q1 was the independent variable (Model A), men had an unadjusted 10% increase in odds of HSV-2 infection per one-partner increase. Women’s corresponding one-partner increase using Q1 was 33% (Table 2). When Q2 was the independent variable (Model B), the unadjusted increase in odds of HSV-2 positivity were slightly higher: 13% and 35% for men and women, respectively. In Model C the larger of the responses to Q1 and Q2 was the independent variable. Model C produced similar results to Model B, with unadjusted increases in odds of HSV-2 positivity of 13% for men and 37% for women, per one-partner increase. For all

![Figure 1 Log odds of prevalent HSV-2 infection according to number of partners, with partners measured as the larger of Q1 and Q2.](image-url)
models, adjustment for age and interview mode did not meaningfully change estimates (Table 2). Across all models, the estimates for men differed considerably from women, but within each sex we observed extensive overlap in CIs in all estimates.

Considering men and women separately, precision was approximately equal across all models (Table 2). AUC was similar across all unadjusted models, and also across all adjusted models. The AIC decrease from Model A to Model B indicates improved model fit using Q2 over Q1. The larger AUC in the adjusted models indicates that these perform better than the unadjusted models.

**Discussion**

This simple analysis examined whether repeating a question about a sensitive self-reported behavior led to significant changes in responses. To our knowledge, no other study has evaluated the benefit of repeating a sensitive question. Approximately 1 out of 7 participants changed their responses when asked a second time; as expected, considerably more respondents increased rather than decreased their self-reported number of partners. However, using changed responses in multivariable models did not significantly strengthen associations between lifetime number of partners and odds of HSV-2 seropositivity, nor improve precision of those estimates. The only improvement obtained by asking the question a second time was in model fit.

The only significant predictor of changing response was interview mode: participants using ACASI independently were considerably more likely to revise their responses. Although existing research about sensitive topics as measured by ACASI is somewhat mixed, the majority indicates increased endorsement of sensitive behaviors when ACASI is used [7]. Our findings confirm that participants were more comfortable revising their responses with the more private computer interface.

Our analysis has a number of limitations. As in other studies measuring sensitive behavior, we assumed that a higher reported number of sexual partners was more valid. Our question also specified heterosexual partnerships,

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**Table 2 Unadjusted and adjusted logistic regression models using the first-reported lifetime number of partners (Q1), the second-reported lifetime number of partners (Q2), and the maximum of the first and second responses and odds of HSV-2 seropositivity**

| Model | Unadjusted | Adjusted ** | Unadjusted | Adjusted ** | Unadjusted | Adjusted ** |
|-------|------------|-------------|------------|-------------|------------|-------------|
|       | OR (95% CI) | OR (95% CI) | OR (95% CI) | OR (95% CI) | OR (95% CI) | OR (95% CI) |
| Men   |            |             |            |             |            |             |
| OR    | 1.10 (1.02, 1.19) | 1.08 (1.00, 1.18) | 1.13 (1.05, 1.22) | 1.11 (1.02, 1.21) | 1.13 (1.04, 1.22) | 1.11 (1.02, 1.21) |
| CLR   | 1.33 (1.20, 1.47) | 1.30 (1.17, 1.44) | 1.35 (1.22, 1.49) | 1.33 (1.20, 1.47) | 1.37 (1.24, 1.51) | 1.35 (1.22, 1.49) |
| Women |            |             |            |             |            |             |
| OR    | 1.17 (W); 1.22 (W) | 1.18 (W); 1.23 (W) | 1.17 (M); 1.22 (W) | 1.18 (M); 1.22 (W) | 1.17 (M); 1.22 (W) | 1.18 (M); 1.22 (W) |
| AIC   | 517.83 | 484.98 | 511.27 | 480.25 | 510.10 | 478.65 |
| AUC   | 0.66    | 0.74     | 0.67    | 0.74     | 0.67    | 0.75     |

Abbreviations: OR: Odds ratio; CI: confidence interval; HSV-2: herpes simplex virus type 2; CLR: confidence limit ratio; AIC: Akaike information criterion; AUC: area under the receiver operating characteristic curve; M: men; W: women.

* Model A uses Q1 as the independent variable; Model B uses Q2 as the independent variable; Model C uses the maximum of Q1 and Q2 as the independent variable. All models are based on records with no missing value for Q1, Q2, sex, age, mode of survey administration and HSV-2 seropositivity.

** Adjusted for age and mode of survey administration.
which represent the majority but not the entirety of sexual partnerships on the plantation. We detected significant differences in participants’ willingness to change their responses by interview mode (ACASI vs. interviewer-assisted), but only a small number of individuals completed the survey with the help of an interviewer. Finally, we chose HSV-2 seropositivity as a proxy biomarker of lifetime sexual partners, given the extensive literature documenting this association. Whether our findings about the value of asking a question a second time would hold for other behaviors or outcomes is unknown.

**Conclusion**

In summary, repeating a question about lifetime sexual partners showed that some participants do change their responses, but that the change does not meaningfully affect the observed associations between lifetime partners and HSV-2 risk.

**Competing interests**

The authors declare that they have no competing interests.

**Authors’ contributions**

ANT designed the analysis and contributed extensively to drafting and revising the manuscript. PP carried out the analysis and wrote the first draft of the manuscript. AHN designed and collected the data for the parent study and revised the manuscript. All authors (ANT, PP, AHN) read and approved the final manuscript.

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