The Impact of Respondent–Interviewer Familiarity and Repeated Survey Participation on Abortion Reporting: Evidence from Rajasthan, India

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CONTEXT: *Researchers have long assumed that familiarity between an interviewer and a survey participant reduces the validity of responses, especially for such sensitive behaviors as abortion. However, little empirical evidence exists on this issue.*

METHODS: *Data on 6,041 women aged 15–49 and 133 interviewers who took part in the second (2017) round of the Performance Monitoring and Accountability 2020 survey in Rajasthan, India, were used to examine the effect of interviewer–respondent acquaintance and participation in the prior survey round on women's reporting of induced abortion. Associations were identified using multivariate, multilevel models that adjusted for respondent, interviewer and community characteristics, and that included interviewer random effects.*

RESULTS: *On average, interviewers completed interviews with 41 respondents from their assigned cluster; they reported that they were acquainted with 61% of respondents and that 13% of respondents had participated in the prior survey round. Four percent of women reported having had an abortion. Neither interviewer–respondent acquaintance nor participation in the previous survey round was associated with abortion reporting in any of the multivariate models or in additional sensitivity analyses.*

CONCLUSIONS: *The findings do not support the hypothesis that respondent familiarity with the interviewer or the survey process is associated with lower reporting of sensitive behaviors, like abortion. Future studies should further explore these and other design features to identify those that provide statistically significant improvements in the reporting of abortion and other sensitive behaviors.*

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Social desirability pressures often cause survey respondents to underreport sensitive or stigmatized behaviors.[1] Induced abortion is considered a sensitive topic in nearly all settings, leading to substantial underestimates of its incidence in analyses using official records or direct reports from surveys. For example, using indirect techniques, researchers have estimated that, in India, where termination of pregnancy has been legal since 1971, the annual incidence of abortion was 47 per 1,000 women aged 15–49 in 2015.[2] Yet, in the Indian state of Rajasthan, government data indicate that only two per 1,000 women aged 15–19 had an abortion in a certified facility in 2012,[3] and a population-based survey found that only 3% of pregnancies in Rajasthan end in induced or spontaneous abortion.[4] One reason for disparities among these statistics is widespread reliance on self-induced medication abortion and on uncertified providers;[2,5] it is also possible that abortion is less common in Rajasthan than in other states. Nonetheless, it is unlikely that rates are as low as the recent state-specific data would indicate. To capture uncounted abortions, researchers in India have asked women directly about their experience with pregnancy termination, but many are reluctant to report past abortions because of the persistent stigma associated with the procedure.[6]

To minimize this problem, investigators conducting research on abortion and other sensitive topics, regardless of country, have sought to ensure that no aspect of their survey design has a negative impact on reporting. For example, researchers have long adhered to the idea that interviewers should be unknown to survey participants,[7] on the assumption that familiarity between the interviewer and the respondent reduces the validity of survey responses. Despite limited empirical evidence to support the idea (see below), this stranger-interviewer model has been a mainstay of demographic surveys in low- and middle-income countries. Indeed, the Demographic and Health Survey (DHS) program—the largest survey effort of its kind—subscribes to this paradigm by employing interviewers from outside the communities where they work.*

The Performance Monitoring and Accountability 2020 (PMA2020) project—a series of household and facility

*Part of the impetus for this design is practical, as finding qualified interviewers continues to be difficult, if not impossible, in many parts of low- and middle-income countries. However, the experience of the Performance Monitoring and Accountability 2020 project suggests that this challenge is lessening.

surveys conducted in 11 low-income countries, including India—uses a different approach. In most PMA2020 countries, the vast majority of interviews are conducted by "resident enumerators"—data collectors who live in or very near the enumeration area in which they work.[8,9] Another notable aspect of the project design is the repeated surveying of communities at 6–12 month intervals, resulting in a subset of the population being randomly selected for participation more than once. Both of these design elements—which were implemented with the aim of reducing survey costs and facilitating rapid, frequent data collection—result in greater familiarity between interviewer and respondent, and the second contributes to a general familiarity with surveys and response confidentiality. Although largely untested, these aspects of the design elements could affect reporting of sensitive behaviors in PMA2020 surveys.

Fortunately, the limited research to date suggests that a respondent's prior acquaintance with an interviewer does not reduce the quality of survey data, and may actually improve it. Analyses of data collected in the Dominican Republic found that interviewer–respondent familiarity had no effect on response rates or on responses themselves for nearly all variables investigated, and that familiarity reduced nonresponse and improved response validity for the remaining measures.[10,11] For example, Rodriguez and colleagues found that interviewer–respondent familiarity did not have an impact on the reporting of sensitive information, including whether the respondent had ever had an abortion, when the information was reported during a self-administered portion of the questionnaire.[10] Analyses by Sana and colleagues also provide consistent evidence that the stranger-interviewer norm is not justified; for 16 of the 18 survey questions they examined, the researchers found that interviewer–respondent familiarity had no effect on responses, and for the two questions in which they detected an effect, respondents were less truthful when interviewed by an outsider (responses to most questions were verified using official documents).[11] In another analysis of the same data, the investigators sought to determine whether survey responses differed according to whether interviewers were from the community and knew the respondent, were from the community and did not know the respondent or were not from the community and did not know the respondent.[12] Results indicated that local interviewers—regardless of their familiarity with a specific respondent—obtained more realistic data on female sterilization than did interviewers from outside the community.

More recently, researchers at PMA2020 retrospectively investigated the potential impact of using resident enumerators and repeated cross-sectional face-to-face surveys to monitor family planning indicators in several Sub-Saharan Africa countries.[13] Outcomes of interest in this study were whether the respondent was using modern contraceptives, had ever given birth, had heard about family planning in the media in the past year and had been visited in the past year by a health worker who discussed family planning. Findings indicated that estimates were generally not affected, and that in some settings levels of reports may have increased significantly, if the resident enumerator and the respondent were acquaintances or if the respondent had participated in a prior survey round. Specifically, respondents in Burkina Faso and Kenya were more likely to report current modern contraceptive use if they were acquainted with the resident enumerator than if they were not; no differences were evident in Ghana, Ethiopia and Uganda. In Kenya, the odds of reporting modern contraceptive use were also elevated if respondents had taken part in the prior PMA2020 survey round; findings were null in the other countries. While the authors interpret the greater reporting of this potentially stigmatizing behavior as an improvement in data quality, one limitation of these analyses is that outcomes such as contraceptive use may not be underreported if they are perceived as socially desirable; diversity in social desirability bias may partially explain the heterogeneity of estimates across country contexts.

In this study, we aim to determine whether interviewer–respondent acquaintance and participation in a prior PMA2020 survey round impact reporting of induced abortion in Rajasthan. Although we did not randomly assign respondents to having a resident enumerator whom they knew (or did not know), respondent–interviewer familiarity was essentially a random event. Similarly, reselection for participation in the PMA2020 survey was random. As such, our research questions seek to determine the causal effect of these survey design elements on reporting of abortion. We hypothesized that both acquaintance with the interviewer and participation in the prior round of the family planning survey would not be associated with less willingness to disclose an induced abortion, after adjustment for respondent, interviewer and community characteristics. The results will provide evidence as to whether these survey design elements may be having negative effects on reporting of abortion and other sensitive behaviors in India and other settings that rely on survey data in the absence of vital statistics.

METHODS

Study Setting and Data

Rajasthan had an estimated population of more than 73 million in 2015. Its total fertility rate is 2.4, and the prevalence of modern contraceptive use among women aged 15–49 is 54%; female sterilization accounts for three-quarters of modern method use.[14] Although induced abortion is broadly legal throughout India[6] and is commonly used to control fertility, its measurement has proven challenging.[15] Our analysis used data collected in Rajasthan during the second round of PMA2020.[8] The Indian Institute of Health Management and Research collected the data in April–May 2017, with technical guidance from the Bill & Melinda Gates Institute for Reproductive Health at the Johns Hopkins Bloomberg School of Public Health; round 1 data had been collected during the summer of 2016.

The survey used a two-stage cluster sampling design in which enumeration areas were selected with probability

proportional to size within urban/rural and regional sampling domains, and 35 households were randomly selected from each enumeration area. Residents of each household were invited to participate in a household survey, and all women aged 15–49 in each household to participate in a female survey; female resident enumerators conducted both surveys. In addition, to determine the family planning and abortion services that were available to the women who completed the female survey, the resident enumerators and their supervisors conducted surveys at health service delivery points that served the selected enumeration areas. Global Positioning System (GPS) points were taken as part of each household, female and service delivery point survey. Interviewers obtained consent from all participants prior to administering surveys. Overall, the 147 resident enumerators completed female surveys with 6,041 women, an average of 41 per enumerator.

After completion of their fieldwork, resident enumerators completed a staff survey that collected information on their demographic characteristics and prior survey experience. The institutional review boards at the Johns Hopkins Bloomberg School of Public Health and the Indian Institute of Health Management and Research provided ethical approval.

Measures

The outcome for this investigation was the woman's report, in response to a direct question, of having ever had an abortion. Specifically, women were asked "Have you ever had a pregnancy that miscarried, was aborted or ended in a stillbirth?" followed soon after by the clarifying question "Did that pregnancy end in miscarriage, an abortion or a stillbirth?" We chose this wording to be consistent with a question in India's National Family Health Survey.[16] The independent variables of interest were dichotomous measures indicating whether the resident enumerator and respondent were acquainted and whether the respondent had participated in the prior PMA2020 survey round. Information on acquaintance was provided at the beginning of the interview by the resident enumerator, who indicated whether she and the respondent were "very well acquainted," "well acquainted," "not well acquainted" or "not at all acquainted." We dichotomized the responses by combining the "very well acquainted" and "well acquainted" responses, and the "not well acquainted" and "not at all acquainted" responses. The other independent variable was devised from participants' responses to a question asking whether they had participated in the prior PMA2020 survey round.

Other covariates included in our analyses were the characteristics of respondents, resident enumerators and respondents' communities. The respondent characteristics were age (categorized as 15–19, 20–29, 30–39 or 40–49), marital status (married/cohabiting,† divorced/separated/widowed or never married), highest level of education ever begun (none, primary, secondary or higher), wealth quintile (constructed in the same manner as in DHS surveys), caste (scheduled caste, scheduled tribe, backward caste or general), religion (Hindu, Muslim or other), residence (rural or urban), and parity (0, 1–2, 3–4 or ≥5), all of which we treated as categorical variables in univariate and bivariate analyses, and as category-specific indicator variables in multivariate analyses.

The female resident enumerator characteristics were age (15–19, 20–29, 30–39 or ≥40), marital history (ever married or not), highest level of schooling completed (secondary/technical, university, or graduate school) and parity (0, 1–2 or 3–4). In addition, we included dichotomous measures for participation in the prior PMA2020 round, experience administering surveys prior to joining PMA2020 and whether the resident enumerator thought abortion was legal under any circumstance; we included the last variable because we thought it might capture interviewer behavior, intentional or otherwise, that conveyed negative attitudes toward abortion, and we wanted to account for such behaviors in the analyses in an effort to isolate the independent variable. Lastly, we examined resident enumerator's place of residence: whether she lived in the enumeration area in which she administered the survey and, if not, whether she lived 10 or fewer kilometers away or more than 10 kilometers away. Although resident enumerators were not explicitly instructed to communicate to respondents how close they lived to their assigned enumeration areas, we hypothesized that a resident enumerator's familiarity with the local language, customs and other norms would be greater if she lived in or near the enumeration area, and may have been related to a woman's willingness to disclose sensitive behaviors like abortion. We coded all of these characteristics as indicator variables.

Finally, we included several measures of community characteristics, which we generated using different approaches. For our measures of an enumeration area's modern contraceptive prevalence, average parity and lifetime abortion prevalence, we calculated the value for each respondent as a cluster mean that excluded the woman's own responses. Measures of the service delivery environment—specifically, proximity to abortion services, postabortion care and a pharmacy—were created using data from the service delivery point survey, in which representatives of individual facilities were asked whether they provided these services. We hypothesized that availability of safe abortion services in a respondent's community would be related to whether she had had a prior abortion, and that it could increase the visibility of the frequency of this procedure and thus her willingness to disclose it. For each type of service, we used GPS data to calculate the Euclidian distance between each respondent and the nearest service delivery point, and created dichotomous variables to indicate whether the nearest service delivery point was less than five kilometers away. We then calculated the average of the dichotomous variables for each enumeration area.

†Because they are de facto marriages and are treated as such by PMA2020, cohabiting relationships are categorized as marriages in the remainder of this article.

Analysis

We initially conducted univariate analyses, exploring distributions of women by respondent-level, resident enumerator–level and community-level characteristics that we hypothesized a priori to be confounders of the relationships of interest. We then conducted bivariate analyses examining possible confounding between variables at each level and resident enumerator–respondent acquaintance. We used design-based F tests (for categorical variables) and t tests (for continuous variables) to determine whether the distribution of each variable differed between respondents who were acquainted with their interviewer and those who were unacquainted with her. Using the same set of tests, we also checked whether respondent participation in the prior PMA2020 survey round was confounded.

We then conducted multivariate regression analyses examining women's likelihood of reporting an abortion using multilevel models with resident enumerator random effects to account for unexplained heterogeneity across individual interviewers that we did not seek to quantify. To determine the relative contribution of the sets of variables in explaining the variability in the observed data, we systematically added variables in the following manner: Model 1 included only the random effects term, Model 2 added the two independent variables, Model 3 added respondent characteristics, Model 4 added resident enumerator characteristics and Model 5 added community characteristics. Thus, each model built on the prior one. Geographic clusters and interviewer assignments were perfectly aligned in the data. The random effects model included a random intercept for each resident enumerator; these intercepts are assumed to be uncorrelated across resident enumerators and uncorrelated with level-1 residuals.

We used cluster mean–centered versions of the independent variables and respondent characteristics in our multivariate analyses because we were interested in the within-interviewer effect of these variables. To estimate within-interviewer associations between respondent-specific variables and outcomes of interest, we calculated cluster means for each respondent-specific variable and then subtracted the cluster mean from the individual respondent's answer to generate cluster meanor had been or had been centered variables. The cluster mean–centered variables. The cluster mean–centered variables isolate the within-interviewer association of a given respondent-level variable, while the mean–centered variables represent the between-interviewer association of cluster composition of respondent characteristics.[17]

In all univariate and bivariate analyses, we incorporated survey weights and accounted for the sampling design using the Taylor linearization method, which adjusts for clustering due to the complex sampling design in the calculation of standard errors. We used robust standard errors to account for clustering in the multilevel models after confirming standard error heteroskedasticity using the Breusch-Pagan test. In some analyses, a small number of respondents were excluded because they were missing data on variables of interest. We conducted all analyses in Stata version 15 and determined statistical significance using an alpha of .05.

We conducted a number of sensitivity analyses to test the robustness of our findings. To test the impact of coding our independent variables differently, we generated alternative indicators of resident enumerator–respondent acquaintance and whether the resident enumerator lived in, near to (≤10 km) or far from (>10 km) the enumeration area. We also tested different model specifications. These included the inclusion of a sampling weight covariate (to check whether the probability of selection may have affected the observed relationships) and using an alternative number of integration points (to ensure our coefficients reflected the true maximum likelihood of the observed data for the models).

RESULTS

Descriptive Findings

Of the 147 resident enumerators, 133 completed the post–data collection survey; their data represent 91% of the completed female surveys. The characteristics of women who had been interviewed by resident enumerators who completed the post–data collection survey were similar to those of women interviewed by resident enumerators who did not complete the survey, with the exception of respondent caste and prior PMA2020 survey round participation. Compared with women whose interviewers had not completed the post–data collection survey, those whose interviewers had completed the survey were more likely to belong to a scheduled tribe (18% vs. 3%) or a general caste (22% vs. 12%) and less likely to belong to a scheduled caste (22% vs. 28%) or another backward caste (38% vs. 7%); they also were more likely to have participated in the prior survey round (13% vs 5%).

The 133 resident enumerators who completed the survey were 26 years old, on average, and 71% were or had been married (Table 1). Forty-one percent had a secondary education or technical training, 34% had completed university and 25% had some graduate-level education. About half (53%) had one or two children, 9% had three or four children, and 38% were nulliparous. Fifty-five percent resided in the enumeration area in which they worked, while 24% lived less than 10 kilometers away. Most (83%) resident enumerators had conducted surveys in Rajasthan during Round 1 of PMA2020, and one-third had administered surveys prior to PMA2020. Sixty-five percent thought that abortion was legal in India under any circumstance. Resident enumerators reported that they were acquainted with 61% of respondents, and that 13% of respondents had participated in the prior survey round (not shown).

Tables 2 through 4 present percentage distributions of respondents by their own characteristics, by those of their resident enumerator and by those of their community, respectively—both overall and according to the independent variables (respondent–interviewer acquaintance and prior PMA2020 participation). In total, only 4% of

TABLE 1. Percentage distribution of resident enumerators, by selected characteristics, PMA2020 Survey Round 2, Rajasthan, India, 2017

Characteristic	% (N=133)
Age (N=132)	
15–19	9.1
20–29	72.7
30–39	15.2
40–49	3.0
Ever married	
No	28.6
Yes	71.4
Education	
Secondary/technical school	41.4
University	33.8
Graduate school	24.8
Parity	
0	38.4
1–2	52.6
3–4	9.0
Lives in assigned enumeration area (N=131)	
Yes	55.0
No (lives ≤10 km away)	23.7
No (lives >10 km away)	21.4
Was interviewer in prior PMA2020 survey round (N=128)	
No	17.2
Yes	82.8
Has been interviewer for non-PMA2020 survey (N=132)	
No	68.2
Yes	31.8
Thinks abortion is legal under any circumstance (N=120)	
No	35.4
Yes	64.6
Total	100.0

Notes: Sample size was less than 133 for some measures because of nonresponse. Percentages may not total 100.0 because of rounding.

TABLE 2. Percentage distribution of women aged 15–49, by selected characteristics, according to whether they were acquainted with their resident enumerator and whether they had participated in the prior survey round, PMA2020, Rajasthan, India, 2017

Characteristic	All (N=6,041)	Acquainted with resident enumerator		Participated in prior PMA2020 survey round	
		No (N=2,306)	Yes (N=3,735)	No (N=5,296)	Yes (N=720)
Ever had abortion					
Yes	3.5	4.0	3.2	3.5	3.9
No	96.5	96.0	96.8	96.5	96.1
Age					
15–19	18.9	19.0	18.9	19.1	17.7
20–29	36.1	37.1	35.5	36.1	35.9
30–39	27.0	26.3	27.5	27.3	25.1
40–49	18.0	17.6	18.2	17.5	21.3
Marital status					
Married	75.7	77.1	74.8	76.0	72.7
Divorced/separated/widowed	2.7	2.8	2.6	2.6	3.4
Never married	21.6	20.1	22.6	21.4	23.9
Education					
None	36.7	38.6	35.5	37.4	32.0
Primary	24.4	24.4	24.4	24.0	26.3
>secondary	38.9	37.1	40.1	38.6	41.7
Wealth quintile					
Poorest	16.3	16.7	16.1	17.0	12.6
Second poorest	17.5	17.7	17.4	16.9	20.8
Middle	19.7	19.5	19.8	19.5	20.8
Second wealthiest	21.5	23.5	20.3	21.6	21.0
Wealthiest	24.9	22.7	26.4	25.0	24.9
Caste of household head					
Scheduled caste	22.4	20.8	23.4	22.0	24.9
Scheduled tribe	17.0	18.9	15.9	16.7	19.7
Other backward class	39.3	36.8	40.9	39.4	38.4
General	21.3	23.6	19.8	22.0	17.0
Religion of household head					
Hindu	85.3	85.7	84.9	85.4	84.2
Muslim	13.3	13.6	13.1	13.2	14.6
Other	1.4	0.6	1.9	1.5	1.2
Residence					
Rural	64.1	58.7	67.5	64.0	63.8
Urban	35.9	41.3	32.5	36.0	36.2
Parity					
0	31.0	30.5	31.4	31.0	31.3
1–2	36.1	36.4	35.9	36.0	37.0
3–4	24.7	24.5	24.8	24.9	23.2
≥5	8.2	8.6	7.9	8.2	8.4
Total	100.0	100.0	100.0	100.0	100.0

Notes: All estimates include weights to account for complex survey design and nonresponse. No statistically significant differences were evident by acquaintance with resident enumerator or prior survey participation. Percentages may not total 100.0 because of rounding.

respondents reported a prior abortion (Table 2). Fifty-five percent of women were younger than 30, and 76% were married. More than one-third (37%) had never attended school, nearly 40% were from historically disadvantaged castes (scheduled castes or scheduled tribes), and 85% resided in a Hindu household. Most women (64%) resided in rural areas of Rajasthan, and more than one-third (36%) had one or two children. None of women's characteristics differed according to whether respondents were acquainted with their resident enumerator or had taken part in the prior PMA2020 survey round.

Overall, 73% of respondents were interviewed by a resident enumerator who was aged 20–29, and a similar percentage by one who had ever been married (Table 3). About half of women (52%) were interviewed by a resident enumerator who lived within the bounds of their assigned enumeration area. Seventy-eight percent of women were interviewed by a resident enumerator who had participated in the prior PMA2020 survey round, and 30% by one who had survey experience prior to PMA2020. One-third of respondents were interviewed by enumerators who did not know that abortion is legal in India under any circumstance. Only one resident enumerator characteristic was associated with interviewer–respondent acquaintance: Sixty-one percent of women who were acquainted with their resident enumerator lived in the same enumeration area as their interviewer, compared with only 36% of women who were not acquainted with their interviewer. No differences in resident enumerator characteristics were associated with respondent participation in the prior PMA2020 survey round.

TABLE 3. Percentage distribution of women aged 15–49, by selected characteristics of their resident enumerator, according to whether they were acquainted with their resident enumerator and whether they had participated in the prior survey round, PMA2020, Rajasthan, India, 2017

Resident enumerator characteristic	All (N=5,469)	Acquainted with resident enumerator		Participated in prior PMA2020 survey round	
		No (N=2,008)	Yes (N=3,461)	No (N=4,766)	Yes (N=683)
Age					
15–19	9.0	7.5	10.0	9.9	3.1
20–29	72.9	66.5	76.9	71.4	82.6
30–39	14.4	20.5	10.6	15.3	9.0
40–49	3.7	5.5	2.5	3.4	5.2
Ever married					
Yes	73.8	80.6	69.6	73.2	77.4
No	26.2	19.4	30.4	26.8	22.6
Education					
Secondary/technical school	40.3	36.1	42.8	40.3	40.8
University	32.2	39.6	27.6	32.2	30.5
Graduate school	27.6	24.3	29.6	27.5	28.7
Parity					
0	37.9	28.1	43.9	38.5	33.0
1–2	52.2	58.0	48.6	51.3	58.6
3–4	9.9	13.9	7.5	10.2	8.4
Lives in assigned enumeration area					
Yes	51.6	36.0**	61.1**	50.5	59.0
No (lives ≤10 km away)	25.2	29.4**	22.6**	24.9	25.1
No (lives >10 km away)	23.3	34.6**	16.4**	24.5	16.0
Was interviewer in prior PMA2020 survey round					
No	22.4	28.2	19.2	22.7	19.2
Yes	77.6	71.8	80.8	77.3	80.8
Has been interviewer for non-PMA2020 survey					
No	70.1	65.7	72.8	70.5	67.5
Yes	29.9	34.3	27.2	29.5	32.5
Thinks abortion is legal under any circumstance					
Yes	66.2	64.1	67.5	65.1	73.2
No	33.8	35.9	32.5	34.9	26.8
Total	100.0	100.0	100.0	100.0	100.0

**p<.01. *Notes*: All estimates include weights to account for complex survey design and nonresponse. Statistical significance was determined using design-based F tests for categorical variables and t tests for continuous variables. Percentages may not total 100.0 because of rounding.

Table 4 presents respondents' community-related characteristics. Twenty-four percent of respondents lived in an enumeration area where the nearest facility that provided postabortion care was, on average, less than five kilometers away; the corresponding proportions for the nearest facility providing abortion and for the nearest pharmacy were 19% and 52%, respectively. The mean prevalence of modern contraceptive use in women's communities was 43%, and lifetime abortion prevalence was 4%. Finally, average parity across enumeration areas was 1.9. Modern contraceptive prevalence was the only one of these measures that differed significantly by acquaintance: The community modern contraceptive prevalence rate was greater among women acquainted with their interviewer than among women not acquainted with their interviewer (45% vs. 39%). None of the community-level covariates were associated with respondent participation in the prior survey round.

Multivariate Findings

In our first multivariate model (not shown), 42% of the variability in abortion reporting was explained by clustering at the interviewer level, which is equivalent to clustering at the enumeration area level. In Model 2, which added the independent variables, we see that neither resident enumerator–respondent acquaintance nor respondent participation in the prior PMA2020 survey round affect abortion reporting (Table 5). Moreover, rho was unaffected: The variability in abortion reporting explained by clustering at the interviewer level remained at 42%. In Model 3, we included the cluster mean–centered, respondent-level characteristics; however, this did not affect the percentage of variability in the abortion reporting explained by the interviewer.

When we added resident enumerator characteristics, in Model 4, the proportion of the variability in the dependent variable that is explained by the interviewer cluster declined to 35%. Moreover, we still do not see any statistically significant associations between the independent variables and abortion reporting. Finally, in Model 5, we added the community characteristics. These additions reduced the variability in abortion reporting explained by the interviewer cluster to 32%. Once again, however, no statistically significant relationships are evident between interviewer–respondent acquaintance and abortion reporting, or between respondent participation in the previous PMA2020 survey round and abortion reporting. The value of the corrected Akaike information criterion gradually decreased from 1,415 in Model 1 (not shown) to 1,031 in Model 5, suggesting that the final model best explains the observed data. Although some of our covariates had statistically significant associations with abortion reporting, our models were not designed to adjust for the confounding of these variables and should not be used to infer associations.

To test the robustness of our findings, we conducted a number of sensitivity analyses (not shown). First, given the four response options, we could have dichotomized the acquaintance variable differently. We found that using only "not acquainted" as the reference category and combining the "not well acquainted" responses with the "well acquainted" and "very well acquainted" responses did not qualitatively affect the results, although the odds ratio was closer to the null (odds ratio, 1.1; 95% confidence interval, 0.4–2.8). When we used the non–cluster mean–centered acquaintance variable to investigate the relationship between acquaintance and abortion reporting, our results again were statistically nonsignificant and closer to the null than were our primary findings (1.3, 0.7–2.5). Generating a six-category variable that combined our original acquaintance measure with an indicator of whether the resident enumerator lived within, close to or far from the assigned enumeration area also resulted in null findings.

In the final models presented in Table 5, we accounted for the sampling design by adjusting for urban/rural strata and interviewer (which is synonymous with enumeration area) clustering. Many researchers include survey weights in such analyses, although the necessity of this is debated. When we included the female sampling weights as a continuous explanatory variable (not shown), our results remained similar to our original findings, both for resident enumerator–respondent acquaintance (odds ratio, 1.8; 95% confidence interval, 0.6–5.2) and for respondent participation in the prior PMA2020 survey round (1.1, 0.7–1.8), and the sampling weight variable was not associated with abortion reporting (1.3, 0.8–2.2). In addition, we tested the use of different numbers of integration points (between eight and 40) in our multivariate models and confirmed that our coefficient results were stable. Overall, the results from these sensitivity analyses demonstrate that our primary findings are robust to many model specifications.

DISCUSSION

We found that interviewer–respondent familiarity and respondent participation in the prior survey round were not associated with reporting of abortion in a face-to-face survey in Rajasthan, India. Given that we view these exposure variables as random events, we interpret our findings as evidence that respondent familiarity with the interviewer or with the survey process has no causal effects on reporting of abortion, and we reject the hypothesis that these survey features impede reporting of sensitive behaviors. Our findings are largely consistent with previous reports that familiarity between respondents and interviewers did not reduce—and in some instances may have improved—data quality in face-to-face or self-administered surveys.[7,10–13] Although our findings are derived from a survey conducted in Rajasthan, India, we believe that this evidence, in conjunction with results from prior research, suggests that these results may be relevant to other, similar settings that rely on survey data in the absence of vital statistics.

This study has a number of strengths. The large sample size—the analysis included survey responses from more than 6,000 women—and the diversity of responses enabled us to test complex models. The survey included questions on a range of socioeconomic and reproductive health topics, allowing us to adjust for many potentially confounding variables. Moreover, because we had demographic and other information about the majority of interviewers, we were all able to adjust for these characteristics in assessing whether resident enumerator–respondent familiarity and respondent participation in the prior survey round were associated with abortion reporting. In addition, because PMA2020 contemporaneously collects GPS and other data at service delivery points, we were able to account for women's access to abortion and postabortion care services, as well as to pharmacies, where women commonly obtain pills for medication abortion.[4] Unlike reporting of other potentially sensitive behaviors, such as use of modern contraceptives, reporting of abortion has a reliably monotonic

TABLE 4. Selected enumeration area–related characteristics of women aged 15–49, according to whether the women were acquainted with their resident enumerator and whether they had participated in the prior survey round, PMA2020, Rajasthan, India, 2017

Characteristic	All (N=6,041)	Acquainted with resident enumerator		Participated in prior PMA2020 survey round	
		No (N=2,306)	Yes (N=3,735)	No (N=5,296)	Yes (N=720)
% living in enumeration area in which mean distance to nearest facility providing postabortion care is <5 km	24.4	22.1	27.6	25.0	28.9
% living in enumeration area in which mean distance to nearest facility providing abortion is <5 km	19.3	21.6	17.9	18.8	23.3
% living in enumeration area in which mean distance to nearest pharmacy is <5 km	52.0	55.8	49.6	51.9	52.5
Mean prevalence of modern contraceptive use in enumeration area	43.0	39.4**	45.2**	42.6	45.5
Mean parity in enumeration area	1.9	1.9	2.0	2.0	1.9
Mean lifetime prevalence of abortion in enumeration area	3.5	4.1	3.0	3.5	3.4

**p<.01. *Notes*: All estimates include weights to account for complex survey design and nonresponse. Statistical significance was determined using design-based F tests for categorical variables and t tests for continuous variables.

TABLE 5. Odds ratios (and 95% confidence intervals) from multilevel regression analyses examining associations of resident enumerator–respondent acquaintance and respondent's prior participation in a PMA2020 survey with respondent's reporting of abortion

Measure	Model 2† (N=6,016)	Model 3 (N=5,993)	Model 4 (N=4,984)	Model 5 (N=4,951)
INDEPENDENT VARIABLES				
Respondent acquainted with resident enumerator				
No (ref)	1.0	1.0	1.0	1.0
Yes	1.7 (0.7–3.8)	1.8 (0.8–4.2)	1.8 (0.6–5.1)	1.7 (0.6–5.1)
Respondent participated in previous survey round				
No (ref)	1.0	1.0	1.0	1.0
Yes	1.0 (0.6–1.6)	1.0 (0.6–1.6)	1.1 (0.7–1.9)	1.1 (0.7–1.9)
RESPONDENT CHARACTERISTICS				
Age				
15–19 (ref)	na	1.0	1.0	1.0
20–29	na	1.0 (0.4–2.6)	0.8 (0.3–2.6)	0.8 (0.3–2.5)
30–39	na	1.2 (0.6–2.6)	1.1 (0.4–2.9)	1.1 (0.4–2.8)
40–49	na	0.5 (0.2–1.2)	0.5 (0.2–1.3)	0.5 (0.2–1.3)
Marital status				
Married (ref)	na	1.0	1.0	1.0
Divorced/separated/widowed	na	0.6 (0.2–1.9)	0.8 (0.3–2.4)	0.8 (0.3–2.5)
Never married	na	0.1 (0.0–0.5)*	0.1 (0.0–0.9)*	0.1 (0.0–1.0)
Education				
None (ref)	na	1.0	1.0	1.0
Primary	na	1.2 (0.8–1.8)	1.1 (0.7–1.8)	1.1 (0.7–1.8)
≥secondary	na	1.5 (0.9–2.8)	1.7 (0.9–3.3)	1.8 (0.9–3.3)
Wealth quintile				
Poorest (ref)	na	1.0	1.0	1.0
Second poorest	na	0.6 (0.3–1.1)	0.4 (0.2–0.8)	0.4 (0.2–0.8)*
Middle	na	0.7 (0.4–1.5)	0.6 (0.3–1.4)	0.5 (0.2–1.2)
Second wealthiest	na	0.6 (0.3–1.3)	0.5 (0.2–1.3)	0.5 (0.2–1.2)
Wealthiest	na	0.6 (0.3–1.5)	0.6 (0.2–1.6)	0.5 (0.2–1.4)
Caste of household head				
Scheduled caste (ref)	na	1.0	1.0	1.0
Scheduled tribe	na	0.6 (0.3–1.3)	0.6 (0.2–1.7)	0.6 (0.2–1.7)

continued

TABLE 5 (continued)

Measure	Model 2† (N=6,016)	Model 3 (N=5,993)	Model 4 (N=4,984)	Model 5 (N=4,951)
Other backward caste	na	0.6 (0.3–1.0)	0.5 (0.3–1.0)*	0.5 (0.3–0.9)*
General	na	1.0 (0.5–1.9)	0.9 (0.5–1.9)	0.9 (0.5–1.8)
Religion of household head				
Hindu (ref)	na	1.0	1.0	1.0
Muslim	na	1.5 (0.5–4.1)	1.1 (0.3–3.8)	1.1 (0.3–3.9)
Other	na	1.6 (0.8–3.3)	1.3 (0.6–3.0)	1.3 (0.6–3.0)
Residence				
Rural (ref)	na	1.0	1.0	1.0
Urban	na	3.5 (1.7–7.2)*	5.9 (2.5–13.1)*	5.2 (1.9–14.2)*
Parity				
0 (ref)	na	1.0	1.0	1.0
1–2	na	5.2 (1.7–15.3)*	7.5 (2.8–20.2)*	8.0 (2.8–22.8)*
3–4	na	7.0 (2.4–20.4)*	10.4 (3.9–27.7)*	11.6 (4.2–32.5)*
≥5	na	6.3 (1.9–20.8)*	11.3 (3.7–34.3)*	13.0 (4.1–41.1)*
RESIDENT ENUMERATOR CHARACTERISTICS				
Age				
15–19 (ref)	na	na	1.0	1.0
20–29	na	na	0.4 (0.1–1.5)	0.5 (0.2–1.6)
30–39	na	na	0.4 (0.1–2.3)	0.4 (0.1–2.5)
40–49	na	na	0.7 (0.1–9.0)	0.9 (0.1–6.9)
Ever married				
No (ref)	na	na	1.0	1.0
Yes	na	na	0.6 (0.2–2.0)	0.7 (0.2–2.2)
Education				
Secondary/technical school (ref)	na	na	1.0	1.0
University	na	na	2.5 (1.0–6.4)*	2.8 (1.1–7.2)*
Graduate school	na	na	0.9 (0.3–2.4)	0.8 (0.3–2.1)
Parity				
0 (ref)	na	na	1.0	1.0
1–2	na	na	0.6 (0.2–1.9)	0.6 (0.2–2.0)
3–4	na	na	1.9 (0.4–8.6)	1.9 (0.4–8.6)
Lives in assigned enumeration area				
Yes (ref)	na	na	1.0	1.0
No (lives ≤10 km away)	na	na	0.8 (0.3–2.1)	0.8 (0.3–2.1)
No (lives >10 km away)	na	na	0.5 (0.2–1.3)	0.5 (0.2–1.3)
Was interviewer in prior PMA2020 survey round				
No (ref)	na	na	1.0	1.0
Yes	na	na	0.6 (0.3–1.4)	0.6 (0.3–1.5)
Thinks abortion is legal under any circumstance				
Yes (ref)	na	na	1.0	1.0
No	na	na	0.8 (0.4–1.7)	0.8 (0.3–1.7)
ENUMERATION AREA CHARACTERISTICS				
Mean distance to nearest facility providing postabortion care is <5 km				
No (ref)	na	na	na	1.0
Yes	na	na	na	0.3 (0.1–1.2)
Mean distance to nearest facility providing abortion is <5 km				
No (ref)	na	na	na	1.0
Yes	na	na	na	6.4 (1.2–32.8)*
Mean distance to nearest pharmacy is <5 km				
No (ref)	na	na	na	1.0
Yes	na	na	na	1.3 (0.6–2.7)
Prevalence of modern contraceptive use	na	na	na	1.0 (0.8–1.3)
Mean parity	na	na	na	1.6 (0.6–4.3)
Rho	*0.42*	*0.42*	*0.35*	*0.32*
Corrected AIC	*1,416*	*1,313*	*1,037*	*1,031*

*p<.05. †Model 1, which included only the random effects term, is not shown. *Notes*: ref=reference category. na=not applicable. AIC=Akaike information criterion.

bias. This means that our null findings are not the result of some women being more likely to report an abortion as a result of social desirability pressure and others being less likely to do so; the stigma surrounding abortion consistently works to reduce reporting of abortion. We also conducted several sensitivity analyses that illustrated that our findings are robust.

However, this study also has limitations. The primary weakness is the conflation of abortion experience and abortion reporting. The dependent variable is an indicator of both prior abortion experience and the willingness to report it in a survey. Although we know that there was significant underreporting of abortion, we tried to isolate the effect of resident enumerator–respondent acquaintance and prior participation in the PMA2020 survey round by adjusting for several respondent and community characteristics that we hypothesized were associated with experience of abortion and willingness to report. We feel this allowed us to separate the independent association between our exposure variables and abortion reporting. Including a question on respondents' knowledge of abortion's legal status would have allowed us to better isolate the relationships of interest.

Another potential limitation is that the independent variables might not be capturing the most important aspects of familiarity. Our acquaintance variable may not be measuring familiarity between the resident enumerator and respondent appropriately, and some features of familiarity, such as the type of relationship (e.g., being family members or similarly aged friends), may be more critical to the reporting of sensitive behaviors than the simple presence of familiarity. In addition, asking respondents to report on their acquaintance with the interviewer may have produced different measures of familiarity. Nonetheless, given the robustness of our findings to different measures of acquaintance, we feel this limitation is minor, and we are confident our results would not change qualitatively in the context of different measures of fertility. Similarly, there could be mismeasurement in whether respondents had participated in the prior PMA2020 survey round. However, given our findings with regard to past participation, we do not believe misclassification could explain our null findings. Finally, our use of Euclidean distance in generating the service delivery environment variables may not be an appropriate approach. Further investigation is required.

Our findings provide support for the use of survey models like that of PMA2020, which trains women from the sampled communities to conduct repeated cross-sectional surveys in the areas where they live.[8] The results challenge the stranger-interviewer norm and illustrate that neither respondent–interviewer acquaintance nor prior participation in a PMA2020 survey negatively affects reporting of sensitive behaviors. To the contrary, it is possible that these design features may actually improve reporting. Although the results were not statistically significant, the odds ratios associated with interviewer–respondent familiarity and respondent participation in the prior PMA2020 round were both greater than 1.0 (1.8 and 1.1, respectively).

Post hoc power calculations indicated that we had only 31% power to detect a statistically significant difference of the size observed for the resident enumerator–respondent familiarity hypothesis, and only 8% power to detect a statistically significant difference of the size observed for the participation in the prior-round hypothesis. For example, to be statistically significant, given the sample size of 6,041 women and the extent of resident enumerator–respondent familiarity, a difference in the prevalence of abortion reporting between respondents acquainted with their interviewer and those unacquainted with their interviewer would have had to be at least 1.5 percentage points, which is more than twice the observed difference of 0.7 percentage points.

In conclusion, the findings suggest that surveys can employ local enumerators and return to communities for repeated surveys (at least once) with limited concern for reduction in reporting of sensitive behaviors. The PMA2020 approach may be especially attractive if using resident enumerators can reduce costs or the challenges associated with entry into a local community. Although we had anticipated that respondent familiarity with the interviewer or prior PMA2020 survey experience might increase their reporting of abortion, we did not observe this phenomenon, perhaps in part because of insufficient power. Further research is needed to determine whether the aspects of survey design observed here improve the validity of abortion reporting in other contexts; whether these design features could actually result in statistically significant increases in reporting of sensitive behaviors, such as abortion, given larger sample sizes; and whether other means of measuring familiarity, including assessing respondents' reports of familiarity with the interviewer, may be important. In future rounds of data collection, we intend to test different question methodologies and interviewer effects in continuance of our efforts to improve abortion reporting on surveys.

REFERENCES

1. Tourangeau R and Yan T, Sensitive questions in surveys, *Psychological Bulletin*, 2007, 133(5):859–883, http://dx.doi.org/10.1037/0033-2909.133.5.859.

2. Singh S et al., The incidence of abortion and unintended pregnancy in India, 2015, *Lancet Global Health*, 2018, 6(1):e111–e120, http://dx.doi.org/10.1016/S2214-109X(17)30453-9.

3. Ministry of Health and Family Welfare, *Health and Family Welfare Statistics of India 2013*, New Delhi: Ministry of Health and Family Welfare, Statistics Division, 2013.

4. Office of the Registrar General & Census Commissioner, Government of India, *Annual Health Survey 2012–2013 Fact Sheet: Rajasthan*, New Delhi: Office of the Registrar General & Census Commissioner, 2013, http://www.censusindia.gov.in/vital_statistics/AHSBulletins/AHS_Factsheets_2012-13/FACTSHEET-Rajasthan.pdf.

5. Elul B et al., *Unwanted Pregnancy and Induced Abortion: Data from Men and Women in Rajasthan, India*, New Delhi: Population Council, 2004.

6. Duggal R and Ramachandran V, The abortion assessment project—India: key findings and recommendations, *Reproductive Health Matters*, 2004, 12(24 Suppl.):122–129, http://dx.doi.org/10.1016/S0968-8080(04)24009-5.

7. Weinreb AA, The limitations of stranger-interviewers in rural Kenya, *American Sociological Review*, 2006, 71(6):1014–1039, http://dx.doi.org/10.1177/000312240607100607.

8. Zimmerman L et al., PMA2020: rapid turn-around survey data to monitor family planning service and practice in ten countries, *Studies in Family Planning*, 2017, 48(3):293–303, http://dx.doi.org/10.1111/sifp.12031.

9. Hawes M et al., Response patterns on behavioral outcomes in relation to use of resident enumerators over multiple survey rounds, *PMA2020 Methodological Report*, Baltimore, MD, USA: Bill & Melinda Gates Institute for Population and Reproductive Health, Johns Hopkins University, 2017, No. 1.

10. Rodriguez LA, Sana M and Sisk B, Self-administered questions and interviewer–respondent familiarity, *Field Methods*, 2015, 27(2):163–181, http://dx.doi.org/10.1177/1525822X14549315.

11. Sana M, Stecklov G and Weinreb AA, A test of the stranger-interviewer norm in the Dominican Republic, *Population Studies*, 2016, 70(1):73–92, http://dx.doi.org/10.1080/00324728.2016.1139740.

12. Stecklov G, Weinreb AA and Sana M, Family planning for strangers: an experiment on the validity of reported contraceptive use, *PLoS One*, 2015, 10(8):e0136972, http://dx.doi.org/10.1371/journal.pone.0136972.

13. Safi S et al., Resident interviewers and repeat surveys: effects on measures of reproductive health, paper presented at the annual meeting of the Population Association of America, Chicago, IL, USA, April 27–29, 2017.

14. International Institute for Population Sciences (IIPS) and ICF International, *National Family Health Survey (NFHS-4), 2015–16: Rajasthan Fact Sheet*, Mumbai: IIPS and ICF International, 2017.

15. Arnold F, Kishor S and Roy TK, Sex-selective abortions in India, *Population and Development Review*, 2002, 28(4):759–785.

16. IIPS and ICF International, *National Family Health Survey (NFHS-4), 2015–16: India*, Mumbai: IIPS and ICF International, 2017.

17. Begg MD and Parides MK, Separation of individual-level and cluster-level covariate effects in regression analysis of correlated data, *Statistics in Medicine*, 2003, 22(16):2591–2602, http://dx.doi.org/10.1002/sim.1524.

RESUMEN

Contexto: *Los investigadores han supuesto durante mucho tiempo que la familiaridad entre un entrevistador y una participante en la encuesta reduce la validez de las respuestas, especialmente en lo referente a conductas sensibles como el aborto. Sin embargo, existe poca evidencia empírica sobre este tema.*

Métodos: *Los datos de 6,041 mujeres de 15 a 49 años de edad y de 133 entrevistadores que participaron en la segunda ronda (2017) de la encuesta Monitoreo del Desempeño y Rendición de Cuentas 2020 en Rajasthan, India, se utilizaron para examinar el efecto de la familiaridad entre entrevistador y entrevistada, así como la participación en la ronda previa de la encuesta, en la forma en que las mujeres reportan abortos inducidos. Se identificaron asociaciones mediante el uso de modelos multivariados y multinivel que se ajustaron a las características de las mujeres entrevistadas, del entrevistador y de la comunidad y que incluyen los efectos aleatorios del entrevistador.*

Resultados: *En promedio, los entrevistadores completaron la encuesta con 41 personas entrevistadas de su conglomerado asignado; informaron que estaban familiarizados con el 61% de las entrevistadas y que el 13% de las entrevistadas habían participado en la ronda previa de la encuesta. Cuatro por ciento de las mujeres reportaron haber tenido un aborto. Ni*

la familiaridad entre la mujer entrevistada y el-entrevistador, ni la participación en la anterior ronda de la encuesta se asociaron con los informes de aborto en ninguno de los modelos multivariados, o en análisis de sensibilidad adicionales.

Conclusiónes: *Los hallazgos no apoyan la hipótesis de que la familiaridad de la persona entrevistada con el entrevistador o el proceso de la encuesta están asociados con un menor reporte de comportamientos sensibles, como el aborto. Los estudios futuros deberían explorar más a fondo estas y otras características de diseño para identificar aquellas que proporcionan mejoras estadísticamente significativas en los informes de aborto y otras conductas sensibles.*

RÉSUMÉ

Contexte: *Les chercheurs supposent depuis longtemps que, lorsqu'un intervieweur et une participante à l'enquête se connaissent, la validité des réponses diminue, surtout en ce qui concerne les comportements sensibles tels que l'avortement. Il n'existe cependant guère de données empiriques sur la question.*

Méthodes: *Les données relatives à 6,041 femmes de 15 à 49 ans et 133 intervieweurs ayant participé au second cycle (2017) de l'étude Performance Monitoring and Accountability 2020 au Rajasthan (Inde) ont servi à examiner ce qui se passe, concernant la déclaration par la femme d'un avortement provoqué, quand l'intervieweur et la répondante se connaissent et qu'elle a participé au cycle précédent de l'enquête. Les associations ont été identifiées au moyen de modèles multivariés et multiniveaux, sous correction des caractéristiques de la répondante, de l'intervieweur et de la communauté et avec effets aléatoires concernant l'intervieweur.*

Résultats: *En moyenne, les intervieweurs ont interrogé 41 répondantes du groupe qui leur a été affecté; ils ont déclaré connaître 61% des répondantes et ont indiqué que 13% d'entre elles avaient participé au cycle précédent de l'étude. Quatre pour cent des femmes ont déclaré s'être fait avorter. Ni le fait que l'intervieweur et la répondante se connaissent, ni la participation au cycle précédent de l'étude ne s'est révélé associé à la déclaration d'un avortement dans aucun des modèles multivariés, pas plus que dans les analyses de sensibilité complémentaires.*

Conclusions: *Les résultats ne confirment pas l'hypothèse d'une déclaration moindre des comportements sensibles tels que l'avortement de la part des répondantes qui connaissent les intervieweurs ou le processus d'enquête. Les études futures devront approfondir l'examen de ces éléments de conception, ainsi que d'autres, pour identifier ceux qui produisent une amélioration statistiquement significative de la déclaration de l'avortement et d'autres comportements sensibles.*

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