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## A Medical Record Linkage Analysis of Abortion Underreporting

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Inaccuracy in women's reports of their abortion histories affects many areas of interest to reproductive health professionals and researchers. The identification of characteristics that affect the accuracy of reporting is essential for the improvement of data collection methods. A comparison of the medical records of 104 American women aged 27-30 in 1990-1991 with their self-reported abortion histories revealed that 19% of these women failed to report one or more abortions. Results of logistic regression analysis indicate that nonwhite women were 3.3 times as likely as whites to underreport. With each additional year that had elapsed since the first recorded abortion, women became somewhat more likely to underreport (odds ratio of 1.3), while each additional year of a woman's education slightly decreased the likelihood of underreporting (odds ratio of 0.7).

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Underreporting of abortions is a persistent problem in studies conducted in the United States and elsewhere, irrespective of the research design or study population. Abortions are underreported at different rates both between and within populations, which suggests that underreporting is not simply a function of individual-level behavioral characteristics. Demographic variation suggests that social forces affect underreporting. Furthermore, how questions about abortion are asked appears to be as important as women's behavioral, demographic and social characteristics.

Inaccuracy in self-reported abortion histories affects many areas of interest to demographers and epidemiologists. Estimates of abortion, contraceptive failure,<sup>1</sup> miscarriage<sup>2</sup> and reproductive histories that rely on self-reports are all subject to bias by abortion underreporting, and the extent of bias in each case is unknown. The determination of the predictors of underreporting is therefore critical to building a body of knowledge that may lead to the development of better data collection methods and more meaningful statistical weights.

Reliability studies have focused chiefly on how different data collection methods affect abortion reporting. Recently, such studies have begun to explore other determinants of underreporting, including social and behavioral variables. Two major approaches have been taken: Many U.S. studies impute underreporting by comparing nationally representative survey self-reports of abortion with expected abortion incidence

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determined from provider data. Studies mainly in other countries have linked women's responses to interviewer-administered questionnaires with abortions documented in medical records.

The primary limitation of many U.S. studies is that they use data on average characteristics of abortion patients, rather than directly matching records, and they rely on complicated algorithms and corrections that introduce opportunities for measurement error. Their strength, however, is their applicability to the American context. By contrast, the studies in other countries that link women and their abortions provide a direct estimate of underreporting, but their results may be limited in their generalizability to U.S. women.

In this research note, we describe a study undertaken to identify the characteristics that make a woman likely to underreport her abortion history. This study linked U.S. women's self-reports of abortion with medical records and thus overcame the limitations of studies based on national samples. Its design is similar to those of studies conducted in other countries, but it incorporates variables meaningful in an American context.

## EARLIER RESEARCH

### Extent of Underreporting

Estimates of abortion underreporting from various nationally representative samples of women tend to be similar. Within studies, however, estimates vary depending on women's characteristics and the survey instrument used. For example, the interviewer-administered National Survey of Family Growth (NSFG) had overall abortion reporting ranges of 35-50% of what is believed to be the actual level of abortion on the 1976, 1982 and 1988 rounds.<sup>3</sup> The 1976 and 1979 National Surveys of Young Women and the 1979-1984 waves of the National Longitudinal Survey of Work Experience of Youth (NLSY) had reporting ranges of 38-59%.<sup>4</sup>

Abortion reporting in these surveys was significantly improved by the use of self-administered questionnaire supplements. For example, overall reporting rates were 65-71% in the self-administered questionnaire that supplemented the 1988 NSFG.<sup>5</sup> A study comparing responses to interviewers in the 1983 NLSY with self-administered questionnaire responses in 1984 revealed that twice as many women acknowledged having had an abortion when using the self-administered format.<sup>6</sup>

Studies from Estonia, Korea and Hawaii linking women's self-reports with their medical records suggest that significant cultural, historical and political differences influence the rate and dynamics of underreporting. In the Estonian study, medical records of abortions occurring in 1991 were matched with 1992 interview responses. The women accurately reported 88% of their lifetime abortions, although exact matches within the year were somewhat less likely.<sup>7</sup> The Korean study matched abortions reported in 1974 with records dated between 1970 and 1973; only 33% of abortions were reported.<sup>8</sup> In the Hawaiian study, 80% of women presenting for a second abortion reported the previous abortion.<sup>9</sup> Thus, underreporting appears to be ubiquitous even in cultures with lower levels of stigma attached to abortion, such as Estonia.<sup>10</sup>

## FERTILITY-RELATED FACTORS

In the United States, underreporting rates vary by the contraceptive method used; the lowest rate is among diaphragm users, while the highest is among condom users.<sup>11</sup> Furthermore, the number of abortions a woman has had is positively related to abortion underreporting; as the number increases, the opportunity for misreporting also increases.<sup>12</sup> By contrast, in Cycle 5 of the NSFG, there was no difference by the number of abortions reported once a woman had reported one.<sup>13</sup>

In Estonia, women who have an abortion to end a pregnancy that resulted from a contraceptive failure and women who have three or more children are the most likely to underreport. Recall bias is probably not a factor for Estonian women because of the salience of the event: Women having an abortion are hospitalized for three days.<sup>14</sup> The explanation that underreporting is related to stigma is compelling because these women obviously place a value on children and motherhood, and they may feel that having an abortion contradicts that status.

## DEMOGRAPHIC FACTORS

The most consistently significant indicator of the likelihood of underreporting among U.S. women is being nonwhite.<sup>15</sup> According to one estimate, survey data reflect only 20-30% of abortions among black women, but are more accurate for whites.<sup>16</sup> In the 1982-1984 NLSY, 45% of abortions among whites were reported, compared with 27% among blacks and 19% among Hispanics.<sup>17</sup> The reporting rate in the 1988 NSFG interviews was 46% among white women and 26% among nonwhites; with use of a self-administered questionnaire, the rate increased to 74% and 67%, respectively.<sup>18</sup> Indeed, abortion underreporting among minorities is probably part of a larger phenomenon: Members of minority groups overreport voting and underreport substance use, criminal offenses, family background and school performance.<sup>19</sup>

Marital status also predicts underreporting in the United States. In the 1982 NSFG, 53% of abortions among married women were reported, compared with 46% of those among unmarried women. (This difference was not maintained in the 1988 NSFG.) In the 1982-1984 NLSY, the proportions were 74% and 30%, respectively.<sup>20</sup>

Similarly, in Estonia, ethnic Estonians have a lower reporting rate than Russians.

Married women have a higher reporting rate than unmarried women, but the difference is not statistically significant. Additionally, being older than 40 is a significant predictor of underreporting, and higher education is associated with higher reporting rates.<sup>21</sup> (American findings on age effects are inconclusive;<sup>22</sup> educational attainment data are not collected by U.S. abortion surveillance systems.)

## SURVEY IMPLEMENTATION FACTORS

A woman's abortion history is among the most sensitive subjects about which she may be asked; research shows that how a woman is asked strongly determines her likelihood of responding accurately. In the NSFG and NLSY, women who had already underreported to an interviewer improved their reporting on self-administered questionnaires.<sup>23</sup> In pretests of the 1995 NSFG, the use of computer-assisted personal interviewing, audio computer-assisted self-interviewing and neutral interview locations improved abortion reporting rates.<sup>24</sup> Randomized response technique

results in higher reporting rates than either self-administered or interviewer-administered questionnaires.<sup>25</sup> Whites, blacks and Hispanics are likely to underreport to an interviewer of another race.<sup>26</sup> Finally, the monthly collection of reproductive event information from respondents yields more accurate data than retrospective reporting about periods of longer duration.<sup>27</sup>

Recall bias is a general problem in retrospective questionnaires and a problem particular to abortion reporting. In the United States, where abortion is much less salient than in systems requiring hospitalization, recall bias may be particularly strong, especially among women who have had several abortions.

## DATA AND METHODS

### The Sample

Our analysis is based on data for participants in the Child Health and Development Studies (CHDS), prospective studies of child and adolescent health. The studies are a joint venture of the University of California at Berkeley, the Kaiser Foundation Research Institute and the Permanente Medical Group. The original CHDS sample consisted of women who were members of the Kaiser Health Plan; the study gathered baseline data on children born to these women between 1959 and 1969, and conducted periodic follow-ups.<sup>28</sup>

In 1990-1991, follow-up data on reproductive and demographic variables were collected from 651 of the female children, who were 27-30 years old at the time. The women filled out self-administered questionnaires, which included full reproductive histories.<sup>29</sup> CHDS researchers then reviewed the women's 1980-1992 Kaiser Health Plan medical records to identify abortion procedures and other obstetric events. The target period was chosen to include the women's adult reproductive histories, but the records also include abortion data from the 1970s.

In all, 368 of the women had Kaiser medical records for the target period; 236 had Kaiser records of some pregnancy-related event, including 109 who had obtained an abortion through the Kaiser Health Plan. Four of these women were excluded from our study because their abortions had occurred after they had completed the questionnaire; one woman was excluded because of missing data. Therefore, the final sample used in our analysis consisted of 104 women, who as a group had 170 abortions.

### DEPENDENT VARIABLE

Operationalizing a variable to measure women's propensity to underreport abortions proved to be more difficult than it initially seemed. The likelihood that medical records and questionnaire data were incorrectly matched by individual is very low. The critical issue, therefore, was how to evaluate the abortion incidence match by woman, particularly when many women had had more than one abortion. Only 19% of the women matched all of their abortions by the exact month and year. By contrast, 90% of women who had at least one abortion in their medical record reported at least one abortion. Only 56% of the women reported all of their abortions within one year of the medical record dates. These proportions show a level of variability similar to that found in a study that compared self-reports of victimization to legal records.<sup>30</sup>

The most cynical interpretation of these data is that people lie, but a more charitable explanation is that people do not remember the timing or character of important events as accurately as we would like. There are many ways to define underreporting. The question then becomes: What is a meaningful approach to studying these data?

Ultimately, we opted for using no date-matching criterion, since our objective was to identify women who underreport their abortions, and even those who gave an inaccurate date of the event showed a willingness to report it. Therefore, women who reported fewer abortions than were indicated in their medical record were categorized as underreporters. The dependent variable measures whether or not a woman is an abortion underreporter.

The questionnaire asked each woman whether she had ever been pregnant and how many times, and included a table on which the woman was asked to note how each pregnancy ended, the month and year of any pregnancy termination and information about her children, if applicable. The self-reported dates (month and year) of abortions were used to construct an abortion count for each respondent, which was compared with the abortion count constructed from the dates in the Kaiser medical record. Some women may have obtained abortions from facilities outside the plan that they did not report to us. Therefore, our estimate constitutes the lower bound of abortion underreporting in this sample.

## INDEPENDENT VARIABLES

Parity, a woman's self-reported total number of live births, was obtained from the reproductive history table on the questionnaire and is coded as a continuous variable; its range was 0-5.\* Race is coded as 0 for white women and 1 for nonwhites. (The sample included 21 black women, four Hispanics and three Asians.) Time is the number of years between the interview date and the woman's first Kaiser record of an abortion; its range is 0-17, with a mean of eight years and a median of nine years. Education denotes the woman's self-report of the number of years of schooling she had completed; this variable ranges from 10 to 20, with a mean and median of 14 years.

We omitted several variables that results of other studies had suggested were important. Age, for example, was not included because its range (27-30) was too small. This omission is supported by a separate analysis of age effect.<sup>†</sup> Influences of contraceptive use could not be studied: The questionnaire collected data on current use, but contraceptive information for the time of the abortion was not sought in the medical records. Finally, marital status was not included in this analysis because few of the abortions occurred within marriage. An analysis of whether current marital status influences women's reporting of abortions obtained prior to marriage showed no effects.

## RESULTS

Altogether, 19% of the women underreported their abortion history; of these, half reported no abortions, and half reported fewer abortions than were in the medical record. Some 46% of the women reported the exact number of abortions reflected in their medical record, and 35% reported more abortions than were in the records.<sup>‡</sup> The 81% of women who reported at least the number of abortions indicated in their medical record accounted for 84% of the abortions among study participants.

Results of logistic regression analysis demonstrated that of the variables examined, race was the strongest predictor of abortion underreporting; nonwhite women were 3.3 times as likely as whites to underreport their abortion experience (see Table 1). Women became somewhat more likely to underreport as the time since their first recorded abortion grew; for each year that had elapsed, the odds of underreporting were raised by 26%. Increasing levels of education, on the other hand, slightly lowered the propensity to underreport; every additional year of schooling decreased the odds of underreporting by 30%. Contrary to expectations, parity was not a significant predictor of underreporting.

Table 1. Logistic regression coefficients (with standard errors) and odds ratios predicting the likelihood that a woman will underreport at least one abortion, by selected characteristics		
Characteristic	Coefficient	Odds ratio
Parity	-.2194 (.27)	0.803
Race	1.1797* (.60)	3.253
Time since first recorded abortion	.2271** (.08)	1.255
Education (yrs.)	-.3445* (.17)	0.709
$\chi^2=14.7$		
df=4		
p=.0048		
*p<.05. **p<.01. Note: For race, the reference group was white women.		

## DISCUSSION

A number of reasons may explain the high rate of abortion reporting in this study. The women in the sample, who were born into a research study and have been studied throughout their lives, have been socialized into the research endeavor as few subjects ever are. Given their continued voluntary participation for up to 30 years, they may be less suspicious and more cooperative research subjects than most. Additionally, almost half of the women completed the questionnaire at Kaiser, which may have caused them to think that their answers could be checked. In fact, the design of this study and implementation of the medical abstraction by CHDS investigators occurred after the questionnaires were collected. Nevertheless, if these women suspected verification, it makes it all the more significant that they continued to underreport.

The effect of the number of years since the first recorded abortion may emphasize the unreliability of memory in reporting distant events: The longer the required length of recall, the more likely it is that one will forget. Another possibility is that women who had their first abortion at a young age find it more difficult to report than those who had an abortion later in life.

To our knowledge, this analysis is the first to reveal a strong effect of education on the propensity to report abortion. This influence may operate in two ways. First, education may tend to improve reporting by increasing accuracy and respondent commitment. Second, education is associated with support for abortion, which may translate into a greater willingness to report it accurately.<sup>31</sup>

Our findings also confirm results of previous analyses that have shown race to be a

significant predictor of reporting behavior. Blacks and Hispanics are significantly less approving of abortion in a variety of circumstances than whites, and these differences may translate into different propensities to report. Furthermore, the composition of abortion beliefs differs for blacks and whites. These differences persist even after demographic variables, religious practices and region of socialization were controlled for.<sup>32</sup> On a related theme, women of high socioeconomic status are more supportive of abortion than are women of lower socioeconomic status.<sup>33</sup>

This study provides evidence for the need to use medical records and surveillance systems to get accurate measures of abortion incidence. Furthermore, it indicates the usefulness of characteristics such as race and education data in the maintenance of medical records, and the need to include these variables in study designs whenever possible. Underreporting of events, including abortion, will persist, and researchers must be sensitive to cultural factors that may influence the perceived threat of different topics. Certainly, qualitative research is warranted to explore some of the influences on how threatening questions are perceived, particularly in reproductive matters, and how research and instruments may better be designed to elicit more accurate information. Finally, researchers must be careful not to impose matching requirements that are so restrictive that they miss substantively valid self-report matches with recorded incidence.

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\*Parity was also operationalized as a dichotomous variable (0-2 vs. three or higher). This alternative specification resulted in no significant effect on the direction, magnitude or significance of the coefficients.

†Indeed, the time variable is difficult to interpret because while it demonstrates recall bias, it also serves as a proxy for age at first abortion. The effects of age and time are inversely related: As age at time of first abortion increases, time since first abortion decreases. An alternate specification, including age and excluding time, yielded the same results.

‡Many of those who overreported their number of abortions were ineligible for Kaiser Health Plan services for periods of time, and because very few women provided accurate dates for their abortions, it is impossible to determine whether these women obtained abortions outside the plan because they lacked eligibility or for other reasons.