Forgotten Marriages? Measuring the Reliability of Retrospective Marriage Histories

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Introduction

Marriage, one of the proximate determinants of fertility, is a rarely studied topic in Sub-Saharan Africa. Of studies that have focused exclusively on marriage, the vast majority have examined transitions to first marriage (Bongaarts 2007; Clark 2004; Dixon 1971; Harwood-Lejeune 2001; Ikamari 2005; Manda and Meyer 2005; Singh and Samara 1996). In particular, age at first marriage has been widely studied, mostly due to its importance in estimating exposure to conception and the presumed risks associated with early marriage. Although studies often include marital status as a control variable, only a handful of studies have specifically examined marital instability resulting from divorce (Amoateng and Heaton 1989; Hutchinson 1990; Locoh and Thiriat 1995; Reniers 2003; Takyi 2001) or widowhood (Ntozi 1997; Ntozi et al. 1999) in Sub-Saharan Africa.

Lack of suitable data may explain the paucity of studies on marriage in this region of the world. While much of our early knowledge of demographic processes comes from the World Fertility Surveys and its successor, Demographic and Health Surveys, these surveys ask relatively few questions about marriage. In most cases, marriage-related questions are limited to marital status at the time of the survey, age at first marriage, and number of other wives. Questions are rarely asked about marital dissolution[1], making it difficult to examine changes in marital status over the life course.

Ideally, prospective panel data would be used to capture changes in marital status over time. Interviewing respondents at regular intervals increases the likelihood that all marriages are being recorded. Prospective panel studies, however, are not without its limitations. First, most studies are not of a long enough duration to adequately capture marital changes throughout an individual's life. While the number of panel studies is increasing in Sub-Saharan Africa, only a handful of studies have been in existence for more than 10 or 15 years. More importantly, changes in marital status are not always tracked. Second, panel studies tend not to collect data on events that occurred before the first survey round. Thus, some information is lost for respondents who married before the first survey round. Third, panel studies are expensive, making it difficult for researchers to acquire adequate funds for long durations. Lastly, survey attrition is an inevitable obstacle in panel studies. At each survey round, a significant proportion of respondents are typically lost to follow-up, mostly due to migration out of the survey area. Respondents who are lost to follow-up are usually different from those who remain in the sample (Alderman et al. 2001; Thomas, Frankenberg and Smith 2001; Thomas et al. (forthcoming)). These differences, however, have not been found to bias coefficients in multivariate analyses (Alderman et al. 2001).

[1] The most recent Demographic and Health Surveys have included a question about the outcome of the previous marriage. A handful of surveys have asked for detailed relationship histories for the five year period before the survey.

The scarcity of prospective panel studies makes it necessary to use alternative sources of data to analyze marital instability. One commonly available option is to use data from cross-sectional surveys. Some, but not all, cross-sectional surveys collect detailed retrospective marriage histories from respondents. These histories may contain information on all past and current spouses, including dates of marriage, number of children, current status of marriage, and how the marriage ended (in cases of terminated marriages).

Retrospective marriage histories, however, are not without problems. The level of accuracy and completeness of collected histories depends largely on the ability of respondents to recollect and reveal this information to interviewers. Several factors may affect the accuracy and completeness of marriage histories. First, respondents may intentionally or unintentionally fail to mention early or short duration marriages. Second, even if respondents successfully recall their marriages, they may fail to remember detailed information such as marriage dates and number of children produced during the marriage. Third, determining which unions constitute a marriage may also be a problem. In Sub-Saharan Africa, marriage is not necessarily perceived as a discrete event (Van de Walle 1993). Rather, it is a process composed of multiple stages, including the exchange of gifts, initiation of sexual relations, provision of bridewealth, and birth of first child. These stages also differ greatly across and within countries, making it difficult to measure and fully capture in demographic surveys. Lastly, a selection problem exists with retrospective marriage histories. In order to provide reports of their past marriages, individuals need to be alive and living in the survey area. Individuals who have died or migrated may have different marriage histories than those who are still living and present in the survey area.

Despite their limitations, retrospective marriage histories continue to be a valuable source of information on marriage in Sub-Saharan Africa. While researchers typically acknowledge the problems associated with marriage histories, it is unclear to what extent results are affected. Ideally, the validity of marriage histories would be measured by comparing them against public records; however, this is not feasible in many parts of Africa where civil marriages are not the norm. An alternative solution is to test their reliability by comparing marriage histories of the same respondent from at least two different points in time. In this paper, I do this by using data from the Malawi Longitudinal Study of Families and Health (MLSFH). This paper focuses on answering the following questions:

1. Do respondents consistently report their spouses, dates of marriage, and status of marriage across surveys?
2. What are the characteristics of marriages that are not reported consistently?
3. What are the characteristics of respondents who fail to report consistent marriage histories?

After answering these questions, I test whether underreporting marriages and reporting inconsistent information during the collection of marriage histories affect analyses of marriage. For example, how does underreporting of marriage and divorce affect the mean number of times married or divorced and the percentage of respondents ever divorced? Do reporting inconsistencies of marriage dates affect age at first marriage?

Literature Review

Three approaches have frequently been used to examine the quality of retrospective data. The first method compares retrospective reports collected from the same respondent on at least two separate occasions (Bignami-Van Assche, Reniers and Weinreb 2003; Meltzer and Hochstim 1970; Murphy 2009; Smith and Thomas 2003). The second method compares retrospective reports to data collected contemporaneously, as in a panel survey (Lillard and Waite 1989; Teitler, Reichman and Koball 2006). The third method compares retrospective reports against official sources such as government records or population registers (Auriat 1991; Courgeau 1992; Mitchell 2010). Of these three methods, the last method provides the best means of assessing the validity of retrospective data. While this is feasible in populations with complete and up-to-date registries, it is not possible in many developing countries, especially in Sub-Saharan Africa, where such registries are typically of poor quality or virtually non-existent. Thus, researchers must utilize one of the first two methods to examine the reliability, rather than validity, of retrospective data.

In both developed and developing countries, researchers have examined the reliability of retrospective reports on a wide range of topics: employment (Mathiowetz and Duncan 1988), migration (Courgeau 1992; Smith and Thomas 2003), health (Meltzer and Hochstim 1970), births (Bignami-Van Assche et al. 2003; Hertrich 1998; Ratcliffe et al. 2002), pregnancy (Hertrich 1998), cohabitation (Teitler et al. 2006), sexual behavior (Dare and Cleland 1994), and other sociodemographic characteristics (Bignami-Van Assche et al. 2003). Though relatively few studies have focused on marriage (Hertrich 1998), much can still be learned from these studies. In this review of the literature, I summarize some of the important findings.

Event Misreporting

Two types of event misreporting are generally found in studies of data quality. The first type is event omission. In this case, respondents fail to report, either intentionally or unintentionally, an event that is being measured. Several reasons may exist for event omission. First, a respondent may simply forget about an event because it occurred far back in time or many similar events have occurred, making it difficult to recall a specific event. Second, a respondent may not have fully understood the question being asked. For instance, an interviewer may ask a respondent about the number of live births she has experienced. Even though a respondent has experienced five live births, she may omit the most recent one because her child died a few hours after birth. Lastly, a respondent may intentionally misreport an event because it produces embarrassment or pain. For instance, an unmarried adolescent may be too embarrassed to report that she has engaged in sexual activity (Buvé et al. 2001) or a mother may not want to mention the death of a child because it brings up painful memories.

The second type of event misreporting is misreporting characteristics of a reported event. Studies examining the quality of retrospective data have often focused on the misreporting of event dates (Auriat 1993; Hertrich 1998; Mitchell 2010; Smith and Thomas 2003; Wringe et al. 2009; Żaba et al. 2009) since they can significantly affect analyses. For various reasons, a respondent may report that an event occurs earlier or later than it actually did. This phenomenon

is referred to as telescoping. Two types of telescoping exist: forward and backward. Forward telescoping occurs when a respondent reports that an event took place more recently than it actually did. Backward telescoping, in contrast, occurs when a respondent reports that an event took place farther back in time than it actually did. Misreporting an event date has the potential to simultaneously increase and decrease the number of events occurring in two adjacent time periods, leading to both under- and over- estimates of calculated rates, such as child mortality rates, during a particular time period. Misreporting of event dates can also affect analyses attempting to assign causality for an event by changing the temporal ordering of events. Lastly, it can possibly lead to misrepresentation of trends in events, such as age at first sex or marriage. Although several studies have shown that inconsistent reporting of age at first sex and marriage exists in surveys, population level indicators were not found to be biased (Cremin et al. 2009; Wringe et al. 2009; Żaba et al. 2009).

Characteristics Associated with Event Misreporting

Studies examining the characteristics associated with event misreporting typically focus on three sets of characteristics: 1) individual 2) event and 3) survey. Individual characteristics under consideration often include age, gender, and education. Since events which took place further back in time are less likely to be remembered, older respondents may have a greater tendency to misreport events than younger respondents. Older respondents, by virtue of having lived longer, may have also experienced several events of a similar nature, making it difficult to recall the particulars of a specific event. Gender is another characteristic that is almost always included in examinations of data quality. The relationship between gender and event misreporting often depends on the type of event under question. While women are generally believed to be better at remembering marriage and family-related events (Auriat 1993; Mitchell 2010; Poulain, Riandey and Firdion 1992), they are often worse than men at recalling periods of unemployment (Jacobs 2002). Lastly, level of education has been found to be negatively associated with event misreporting. More educated respondents are better at recalling events as well as details surrounding these events (Auriat 1991; Mitchell 2010; Peters 1988; Smith and Thomas 2003). Schooling may increase a set of skills related to the ability to recall information.

The second set of characteristics typically included in studies of event misreporting are those related to the event itself, in particular, its duration and saliency. Longer duration events tend to be more memorable than those of a shorter duration. This was found to be the case in a study of the reliability of migration histories in Malaysia (Smith and Thomas 2003). Saliency of an event refers to the importance of an event in a respondent's life. Important events are more likely to be remembered than those of less importance (Sudman, Bradburn and Schwarz 1996). First marriages and births may be better remembered than higher order marriages and births because they are viewed in many cultures as important milestones in life. Studies have also shown that salient events that occur within proximity to one another are more likely to be remembered than those that occur independently in time. Smith and Thomas (2003), for instance, found that being newly married increased the likelihood that female respondents reported a migration event.

Survey characteristics are the final set of characteristics commonly examined in studies of event misreporting. These characteristics can be divided into two groups: survey conditions and interviewer effects. Survey conditions commonly studied include survey length and presence of others during the interview. Due to the length and time required to answer some surveys, respondents may become fatigued and deliberately underreport events as a way to shorten the interview (Murphy 2009). In addition, many interviews take place in the household of the respondent, often within earshot of other household members (Weinreb 2006). Due to fear that others will hear, respondents may deliberately choose not to report certain events.

Interviewer characteristics such as gender, race, education, age, and marital status may also affect survey responses. In a survey conducted in Nepal, Axinn (1991) found that the gender of the interviewer affects responses to some sensitive questions. For example, female respondents are more likely to underreport current pregnancy to male interviewers than female interviewers. Bignami-Van Assche et al. (2003) also found an association between a number of interviewer characteristics and response patterns for a survey of women in rural Malawi. While the strongest relationships exist for gender and fertility status, other variables, including age, marital status, and parents' place of origin were found to be associated with certain responses. In contrast, Becker et al. (1995) found no evidence that the sex of interviewers matters when asking respondents sensitive questions as part of a national family planning questionnaire in Nigeria. In addition to sociodemographic characteristics of the interviewer, whether the interviewer is a "stranger" or "insider" to the respondent may affect survey responses. Weinreb (2006) defined interviewers as "strangers" if they do not personally know the respondents they interview and as "insiders" if they do personally know them. Compared to stranger-interviewers, insider-interviewers had increased response rates and greater response reliability across two survey waves.

Besides these three sets of characteristics, other factors may affect event misreporting. Social desirability may influence how respondents answer questions. For instance, HIV/AIDS-related stigma may lead some respondents to underreport activities, such as sexual activity, that may be seen to affect their own infection or chances of infection. Differences in reliability may also exist depending on the type of questions being asked. Individual response consistency is usually higher for factual type questions, such as age, education, and place of residence, than for knowledge and attitude related questions (Mukherjee 1975).

Data

The data for this analysis come from the Malawi Longitudinal Study of Families and Health (MLSFH), formerly known as the Malawi Diffusion and Ideational Change Project (MDICP). MLSFH is a panel survey that examines the role of social interactions in changing attitudes and behaviors in three rural districts of Malawi: Rumphi (Northern), Mchinji (Central), and Balaka (Southern). The first wave of data collection (MLSFH1), begun in 1998, interviewed 1,541 ever-married women ages 15-49 and 1,065 of their husbands. In 2001, during the second wave (MLSFH2), MLSFH re-interviewed these respondents as well as all new spouses of men and women who remarried between 1998 and 2001. In 2004, the third wave began (MLSFH3).

The original sample and their new spouses were interviewed, along with a sample of approximately 1,000 adolescents, ages 15-24. In the fourth (2006), fifth (2008), and sixth (2010) waves, also known as MLSFH4, MLSFH5, and MLSFH6, all respondents from previous waves in 1998, 2001, and 2004 were included in the sample, along with spouses of 2004 adolescents, and any new spouses of respondents. MLSFH5 also added a sample of approximately 800 parents of MLSFH respondents who were drawn from family listings of MLSFH4 respondents.

In this analysis, I use data collected in MLSFH4 and MLSFH6. These survey waves were chosen for two reasons: nature of marriage histories collected[2] and availability of data on interviewers. In 2006, MLSFH4 began collecting detailed, identifiable information on all reported marriages. Respondents listed up to 10 marriages[3] by reporting the names of all spouses to whom they were ever married, starting with the first spouse and ending with the current/most recent spouse. For each spouse, they provided information on the year the marriage began, how many children they had with that spouse (only collected in 2006), and whether or not they were still married to this spouse. If the marriage ended, they reported the year it ended and the main reason why it ended. The format of marriage histories remained fairly consistent across both waves.

The data collection process differs between MLSFH4 and MLSFH6. In MLSFH4, three data collection teams, "family listing"[4], "main survey", and "biomarker collection", interviewed respondents. The family listing team collected detailed information on family members, intergenerational transfers, investments in children's education, and household mortality. The main survey team administered the main questionnaire and the biomarker collection team administered a questionnaire on VCT testing and conducted HIV testing. Due to the time required to collect information, three separate visits were required. Consequently, not all respondents participated in all three parts of the survey. Of those interviewed by at least one survey team, 93.7 percent participated in the family listing, 88.9 percent in the main survey, and 76.4 percent in the biomarker collection. In 2010, biomarker collection did not occur, which resulted in only one survey team conducting interviews.

In addition to restricting this analysis to respondents who participated in MLSFH4 and MLSFH6, I limit my sample to respondents who were interviewed by the main survey team in both waves. I do this for two reasons. First, information on marriage histories was only collected as part of the main survey questionnaire. Second, the main objective of this paper is to verify the consistency of marriage histories, which necessitates comparing marriage histories from two

[2] In MLSFH1, limited information pertaining to marriage was collected. The survey asked respondents for information on current marital status, number of other wives/co-wives, and year marriage began with current spouse(s). MLSFH2 began collecting marriage histories in 2001. This information, however, was limited to start and end dates of all reported marriages and how marriages ended for the current/most recent spouse, previous spouse, and first spouse. Spouse names were not collected. During MLSFH3, marriage histories were again collected but were limited to the first five reported marriages and spouse names were not collected.

[3] In both survey waves, fewer than 5 respondents reported being married more than 10 times. Specifically, 1 respondent in 2006 and 4 respondents in 2010.

[4] While the questionnaire is referred to as a family listing, MLSFH collected data on all regular household members as well as family members not usually living in the household. These household members include parents of respondents, their spouses, and biological children, regardless of whether they are alive or dead.

surveys. Lastly, I restrict my sample to respondents whose reports of the number of times married is equal to the number of spouses reported in the marriage roster for each survey. I do this for two reasons: interviewer error in collecting marriage histories and data entry error. My analytical sample consists of 729 men and 1,138 women.

Methods

The process used to verify the reliability of marriage histories consists of two parts. In the first part, I match marriages across surveys for each respondent in my analytical sample. The process of matching marriages was not done by a particular algorithm. Since names tend to be spelled differently across surveys, mostly due to the interpretation of the interviewer, I visually match marriages on a case by case basis. I use spouse name as the primary criteria to confirm that a marriage listed in MLSFH4 is the same as a marriage listed in MLSFH6. With very few exceptions, spouse names are similar enough to match without any difficulty.[5] In addition to spouse names, I use marriage dates to verify matches. If a marriage occurred before MLSFH4 and is not listed in both MLSFH4 and MLSFH6, then I refer to this marriage as "unmatched". Table 1 presents descriptive statistics of the matching process. The number of reported marriages is greater in MLSFH4 than in MLSFH6 for both men and women. Match rates indicate that most unmatched marriages are due to respondents not reporting them in MLSFH6.

[Table 1 about here]

In the second part, I reconstruct marriage histories for all respondents in my analytical sample. Table 2 presents the items listed for each reconstructed marriage.[6] To reconstruct these marriage histories, I follow a specific algorithm. If reports of items listed in Table 2 are consistent across surveys, then I use these reports to reconstruct marriage histories. If inconsistent reports are given, then I use information provided in the earlier survey, if reported by the respondent. I use data from the earlier survey because the marriage in question would have happened closer in time to this survey. The literature has shown that reports become less reliable as events take place further back in time (Sudman et al. 1996). If a respondent reports "don't know", then I use data from the later survey, if information was reported. Lastly, I make corrections to marriage start and end dates in cases where marriage dates overlap[7] in the reconstructed marriage histories. In these cases, I use data from the later survey.[8]

[Table 2 about here]

[5] I was unable to match 52 respondents (26 men and 26 women).
[6] Since most separations are soon followed by divorce, I combine divorced and separated into the same category. Reniers (2003) also combined divorce and separation into the same category.
[7] For instance, after reconstructing marriage histories for a female respondent, I find that the reconstructed dates of her first and second marriage are 1995-2000 and 1999-2006, respectively.
[8] I corrected the following number of marriages: Men (50) and Women (88). These marriages are denoted by a variable called "corrected".

Table 3 presents match statistics of retrospective marriage histories. In total, 1,369 and 1,728 marriages are listed for men and women, respectively. Close to 500 marriages are unmatched between MLSFH4 and MLSFH6. They compose 18.8 and 12.9 percent of men's and women's marriages, respectively, listed in the reconstructive marriage history. Since it is not possible to determine whether respondents have reported all their marriages in MLSFH4 and MLSFH6, these numbers mark the lower bound of the true number of respondents' marriages. In Table 3, I also report match statistics at the individual level. Close to one-quarter of men and one-sixth of women in my analytical sample failed to report at least one marriage. Among those married more than once, close to half did not mention one or more marriages. Of respondents who omitted at least one marriage, approximately 20 percent omitted multiple marriages.

[Table 3 about here]

Independent variables

I focus on four sets of independent variables: individual, marriage, survey, and interviewer characteristics. Individual characteristics include age, age squared, region of residence, education, and inconsistent reporting of survey responses. While multiple variations of education are possible, I create a dichotomous variable indicating whether or not the respondent completed five or more grades of schooling. I chose five grades as the cutoff point because it represents the median grades of schooling completed by respondents in the sample. Three variables are included under inconsistent reporting of survey responses: level of education, number of children ever born, and number of sexual partners ever. Respondents are coded as having inconsistent reporting of level of education if their reports of educational attainment (no schooling, primary, secondary) differ between 2006 and 2010.[9] A respondent, for instance, who reports primary education in 2006 and no education in 2010 is coded as having inconsistent reporting for level of education. I code inconsistent reporting of number of children ever born and number of sexual partners ever in a different manner. If respondents report a decline in the number of children ever born or number of sexual partners ever across surveys, then I code them as having inconsistent reporting of these variables. This coding scheme, however, cannot detect other reporting inconsistencies. For instance, in reporting number of sexual partners ever, a respondent may report four in 2006 and six in 2010 even though the respondent may have had more sexual partners.

Marriage characteristics include marriage order, years since marriage began, short duration marriage, and status of marriage. Marriage order is divided into three categories: first, second, and third or higher. I combine third and higher order marriages into a single category because they make up less than 5 percent of all marriages. Years since marriage began is calculated by subtracting the marriage start date from 2006. A short duration marriage is a marriage that lasted five years or less. Among current marriages, I consider a marriage to be of

[9] Three respondents reported that they were still attending school in 2006. I took this account when coding whether the respondent reported inconsistent level of education.

short duration if it began after 2000. Status of marriage refers to the reconstructed status of marriage in 2010. The categories are: still married, divorced, or widowed. I did not include number of children produced in marriage because this information was only collected in 2006.

Survey characteristics include interviewer knows respondent's family (MLSFH4), degree of cooperation (MLSFH4 & 6), and length of survey time (MLSFH6). At the end of each questionnaire, interviewers must answer a series of questions about the preceding interview. In MLSFH4, one of the questions asked interviews "How well do you know the respondent's family?" Possible responses include "not at all", "by name only", "quite well", and "very well". Using these responses, I create a dichotomous variable labeled "interviewer knows respondent's family." If the interviewer reported knowing the respondent's family "by name only", "quite well", or "very well", then I code the interviewer as knowing the respondent's family. If the interviewer reported "not at all", then I code the interviewer as not knowing the respondent's family. This question was not asked in MLSFH6. Questions about the respondent's degree of cooperation were asked in both MLSFH4 and MLSFH6. Possible responses include "bad", "average", "good", and "very good". Because very few interviewers reported "bad" degree of cooperation, I combined "bad" and "average" responses into the same category. The other categories were coded "good" and "very good". The data needed to calculate length of survey time is only available in MLSFH6. I code this variable into three categories: short, middle, and long. Short refers to the 25 percent shortest survey times; middle refers to the middle 50 percent of survey times; and long refers to the 25 percent longest survey times.

Interviewer characteristics were collected in both MLSFH4 and MLSFH6. At the end of data collection, interviewers completed exit questionnaires, which asked them questions about their background, work history, thoughts about MLSFH survey, and HIV/AIDS. I merged data from the interviewer exit questionnaires to respondent data. For reasons unknown, data from MLSFH4 interviewer exit questionnaires are not complete. Data does not exist for 28 percent of respondents in my analytical sample. This problem disproportionately affects respondents living in the Central region, where 47.3 percent do not have interviewer data. In the Southern and Central regions, 17.3 and 20.5 percent, respectively, lack this data. Data from MLSFH6 interviewer exit questionnaires are, for the most part, complete.

Analyses

I use multinomial logistic regression to determine which characteristics are associated with unmatched marriages. Since current marriages are likely to be listed in each survey wave, unmatched marriages should only exist among terminated marriages. If I restrict this analysis to terminated marriages, then I will be introducing bias into my analytical sample. Thus, I use multinomial logistic regression, which allows me to include both current and terminated marriages in my analysis. The three categorical outcomes are: 1) matched terminated marriage 2) unmatched terminated marriage and 3) current marriage. Because this analysis is focused on characteristics associated with unmatched marriages, I select matched terminated marriages as my base outcome. I build three sets of models. In Model 1, I include individual and marriage characteristics. I do not incorporate status of marriage into the model because current marriages

perfectly predict current marriages. In Model 2, I add survey characteristics and MLSFH6 interviewer characteristics. In Model 3, I add MLSFH4 interviewer characteristics. I add MLSFH4 interviewer characteristics last because only a subset of respondents has this data. Since individuals contribute multiple marriages, I adjust for clustering at the individual level.

In addition to event omission, I examine another important aspect of the reliability of retrospective marriage histories: consistent reporting of marriage start and end dates. For obvious reasons, I restrict analyses to marriages that were reported in both MLSFH4 and MLSFH6. As a result, respondents with marriages that are included in these analyses may already be better at providing consistent information. I use logistic regression to determine which characteristics are associated with consistent reporting of marriage start and end dates. I run separate logistic regressions for each outcome: reported consistent marriage start date and reported consistent marriage end date. For the outcome, reported consistent marriage start date, separate regressions are run for men and women. For the outcome, reported consistent marriage end date, regressions are run on a pooled sample of men and women because of a substantial decline in sample size. Furthermore, only terminated matched marriages are included in this part of the analysis. Similar to regressions run in the first set of analyses, I build three sets of models for both outcomes. I include status of marriage in these analyses. Since individuals contribute multiple marriages, I also adjust for clustering at the individual level.

Lastly, I test whether underreporting marriages and reporting inconsistent information during collection of marriage histories affect marriage analyses. I calculate means for age at first marriage, number of times married, ever divorced, number of times divorced, and ever widowed. Specifically, I compare results obtained using data from reported marriage histories to those from reconstructed marriage histories. While reconstructed marriage histories may not be entirely complete, they should represent a lower bound in the true number of marriages in this sample. Depending on the distribution of the outcome, I use either a paired t-test or Wilcoxon signed rank test to test whether calculated means are statistically different from each other. I use paired tests, as opposed to unpaired, because I compare means from the same sample of individuals.

Results

Number of Times Married in MLSFH4 and MLSFH6

My analysis begins by comparing the reported number of times married in each survey year. For reports to be consistent, the number of times married should remain the same or increase over time. Tables 4 and 5 contain the reported number of times married in MLSFH4 and MLSFH6 for men and women, respectively. The left side of each table corresponds to the reported number of times married in MLSFH4 and the top row lists the same figure for MLSFH6. For example, 337 men reported being married only once in 2006 and 2010. According to this figure, none of these men remarried between 2006 and 2010. The shaded areas refer to reported declines in the number of times married. Around 16 and 10 percent of men and women, respectively, reported being married fewer times in 2010 than in 2006. From these tables, it is evident that a fair amount of event misreporting exists. These tables, however, fail to show two other possible cases of misreporting. The first case involves respondents who report an increase

in the number of marriages even though a new marriage did not occur between survey waves. The second case involves respondents who report the same number of marriages even though a new marriage occurred between survey waves.

[Tables 4 & 5 about here]

Characteristics associated with unmatched marriages

In Tables 6a and 6B, I present relative risk ratios of being a current or unmatched marriage versus a matched marriage for men and women, respectively. In Model 1, where I control for individual and marriage characteristics, marriages where women are older are more likely to be unmatched. The direction of the age squared term indicates that the relationship is non-linear and increases with age. While it is not surprising that age is a strong predictor of unmatched marriages for women, it is surprising that this is not the case for men. Inconsistent reporting of certain variables is associated with unmatched marriages; however, the variables differ by gender. Among men, inconsistent reporting of level of education and among women, inconsistent reporting of number of sexual partners ever predict unmatched marriages.

[Tables 6a & 6b about here]

Of marriage characteristics, the number of years since marriage began is positively associated with unmatched marriages, but only among men. Marriages that occurred further in the past are less likely to be remembered (Sudman et al. 1996). Short duration marriages have significantly higher odds of being unmatched. Several reasons may account for this finding. First, short duration marriages may consist largely of unsuccessful marriages, which individuals may prefer to forget. Second, in areas where bridewealth is common, mostly in the North, payment may not have been fully made before the start of marriage. If the couple separates before bridewealth has been paid, the union may no longer be viewed as a marriage. Lastly, short duration marriages may not have produced any children. Because children are considered to be an integral part of marriage, a childless union may no longer be considered as a marriage. Surprisingly, marriage order made little difference in determining whether marriages are unmatched. Considering that earlier events are less reliably reported (Sudman et al. 1996), I expected early marriages to be underreported. My finding conflicts with conclusions reached using data from the World Fertility Surveys, which found that earlier marriages are being omitted by older women (Brandon 1990). The lack of importance in marriage order may be due to respondents consistently omitting early marriages across survey waves, making it impossible to detect omissions.

When I add survey characteristics and MLSFH6 interviewer characteristics in Model 2, two variables are no longer statistically significant for men: inconsistent reporting of level of education and years since marriage began. Among women, inconsistent reporting of level of education becomes marginally significant. Marriages where women report inconsistent level of education have increased odds of being unmatched. Although none of the survey characteristics

appear to have a strong relationship with the outcome among men, length of survey time is associated with unmatched marriages among women. Marriages with the shortest survey times have higher odds of being unmatched, possibly indicating that some women intentionally omit events in order to shorten interview times. Prior interviewing experience (MLSFH6) predicts unmatched marriages; however, the direction of this relationship differs by gender. For men, the direction is in the expected direction: prior interviewing experience lowers the odds of an unmatched marriage. Interviewers with prior experience may have developed skills in probing for responses. In contrast, prior interviewing experience is associated with higher odds of unmatched marriage among women. One potential explanation could be that women are less receptive to probing by interviewers. They may find it obtrusive, decreasing their likelihood of providing complete information. Marriages where men were interviewed by a male interviewer are more likely to be unmatched. It is not clear why this is the case.

In Model 3, I add MLSFH4 interviewer characteristics. As stated earlier, MLSFH4 interviewer data exists for only a subset of respondents. Thus, I do not place much emphasis on results obtained in Model 3. While none of the MLSFH4 interviewer characteristics predict an unmatched marriage among men, being interviewed by a male interviewer in MLSFH6 is positively associated with the outcome among women.

Discrepancies in matched marriages

Table 7 presents descriptive statistics of discrepancies in matched marriages. Overall, 1,038 men's marriages and 1,425 women's marriages were successfully matched between MLSFH4 and MLSFH6. While consistent reporting of marriages provides one dimension of data quality, another dimension examines whether information about these marriages remain consistent over time. In this analysis, items of interest are status of marriage, marriage start date, and marriage end date. Of these three items, little discrepancy exists over the status of marriage. Less than three percent of all marriages had discrepancies in status of marriage (row 1.1). Since discrepancies are minimal, I focus on discrepancies in marriage start and end dates.

[Table 7 about here]

In Figure 1, I present a graphical distribution of discrepancies in marriage start dates by gender.[10] It is clear that a large proportion of discrepancies are centered at zero. A slight negative skew can be observed in both men and women as the distribution tends to be more positive than negative. In section 2 of Table 7, I present a more quantitative approach to the graphical depictions. Row 2.1 confirms that median date discrepancies center at zero. I also examine whether telescoping is a factor in the dating of marriage start dates. Rows 2.4-2.6 provide preliminary evidence that backward telescoping may exist. This may be the case as a greater percentage of discrepancies occur where the MLSFH4 date is later than that of MLSFH6. To test

[10] I removed outliers that affect the overall presentation of data. I define outliers as observations with absolute differences in start dates that are greater than 10 years. These outliers make up less than five percent of matched marriages.

whether these discrepancies are truly significant, I calculate the quartic root of the absolute value of differences in start dates.[11] This measure is robust to outliers. Results indicate that mean discrepancies hover around 1.3 years. These differences, however, are only significant for women. No evidence exists of backward telescoping occurring among men.

[Figures 1 & 2 about here]

I also examine discrepancies in marriage end dates among matched marriages that have ended in divorce or widowhood. Figure 2 presents a graphical distribution of discrepancies in marriage end dates by gender.[12] Similar to marriage start dates, discrepancies are centered at zero for both men and women. While a slight negative skew exists for men, a slight positive skew is observed for women. In section 3 of Table 7, I examine whether telescoping occurs in the dating of marriage end dates. Rows 3.4-3.6 indicate that a very small degree of forward telescoping may exist for both men and women. When I calculate the difference in the mean quartic root of discrepancies, I find no significant differences in mean discrepancies for both genders. Thus, telescoping does not appear to be a concern for marriage end dates.

Characteristics associated with consistent reporting of marriage start dates

Table 8 contains odds ratios of reporting consistent marriage start dates for both genders. Model 1 shows that marriages in the South have 50 percent lower odds of reporting consistent marriage start dates than those in the Central region. Compared to other regions, the South has higher levels of marital disruptions as well as less formal marriage processes, possibly making it more difficult to remember marriage start dates. Not surprisingly, marriages where respondents have completed five or more grades of schooling are more likely to have consistently reported marriage start dates. One possible explanation could be that more educated respondents have a better grasp of dates than those who are less educated. Inconsistent reporting of number of children ever born and number of sexual partners ever is negatively associated with the outcome for women but not for men. This demonstrates that misreporting by women spills over into several domains, especially those of a sensitive nature.

[Table 8 about here]

Several marriage characteristics are significantly associated with the outcome of interest. Marriage start dates are more likely to be consistent for first marriages, probably because first marriages are more memorable than later marriages. While both second and third or higher marriages are less likely to have consistently reported dates for men, this is not the case for women, where only second marriages have lower odds. It is not clear why first and third or higher order marriages have similar odds. The status of the marriage in question is associated with reporting consistent marriage start dates. While marriages ending in widowhood have lower

[11] This refers to $\sqrt[4]{|MLSFH4 - MLSFH6)|}$.
[12] Similar to marriage start dates, I removed any outliers in the data.

odds than current marriages for both genders, lower odds are also found for marriages ending in divorce among women. An explanation for this finding, however, is not apparent. Lastly, short duration marriages are less likely to have consistently reported marriage start dates among women but not men. Short duration marriages may be less memorable than long duration marriages, making it more difficult to recall consistent start dates. It is unclear why this relationship does not exist among men.

In Model 2, I add survey and MLSFH6 interviewer characteristics. With the exception of status of marriage among women, the significance levels of variables do not change. Marriages ending in divorce are no longer associated with consistent reporting of marriage start dates. Several survey characteristics predict consistently reported marriage start dates. Among men, length of survey time, age of the interviewer, and whether the interviewer has prior interviewing experience are associated with the outcome of interest. Shorter interview times have lower odds of reporting consistent start dates, possibly due to rushing through the interview. Similar to results obtained from unmatched marriages, prior interviewing experience is positively associated with the outcome. As mentioned earlier, this is probably due to the ability of experienced interviewers to probe for answers. An obvious explanation does not exist for why marriages where interviewers are older are less likely to report consistent marriages start dates. Among women, only degree of cooperation is found to be significantly associated with the outcome. Marriages where interviewers report average/bad cooperation have lower odds. Interviewers may have reported these women as having average/bad cooperation because they were unwilling to share information or reported "don't know" to many questions.

In Model 3, I add MLSFH4 interviewer characteristics. None of the MLSFH4 interviewer characteristics are associated with reporting consistent marriage start dates.

Characteristics associated with consistent reporting of marriage end dates

In Table 9, I present odds ratios of reporting consistent marriage end dates for men and women combined. In Model 1, as expected, increasing age is associated with lower odds and more education is associated with increasing odds. This is similar to findings for reporting consistent marriage start dates. The age squared term indicates that the relationship between age and the outcome is non-linear. Marriages where respondents are more educated have almost twice the odds of having marriage end dates reported consistently than those who are less educated. As mentioned earlier, more educated respondents may have a better grasp of dates than the less educated. Unlike prior outcomes, no significant relationship exists between inconsistent reporting of survey responses and consistent reporting of marriage end dates. Similar to marriage start dates, short duration marriages have lower odds of consistently reported marriage end dates. Marriages ending in widowhood, as opposed to divorce, probably have higher odds of consistent marriage end dates because the death of a spouse is a distinct event. Divorce, on the other hand, can be a long, drawn-out process, which may begin by couples separating temporarily and end with a decision to permanently terminate the marriage. This may lead to uncertainty as to when the divorce actually occurred.

[Table 9 about here]

In Model 2, marriages that ended in widowhood are no longer significantly associated with the outcome. Degree of cooperation appears to matter for reporting consistent marriage end dates. Marriages where interviewers reported average/bad cooperation displayed half the odds of reporting consistent dates. Lack of interest or cooperation on the part of respondents may result in inconsistent responses. Two interviewer characteristics, being male and ever married, had positive associations with the outcome variable. Male interviewers may be better than female interviewers at probing for responses. Ever married interviewers may develop a better rapport with respondents. As a result, respondents may feel more comfortable discussing terminated marriages, which can be a sensitive topic for some respondents, making it easier for ever-married interviewers to probe for marriage end dates

In Model 3, I add MLSFH4 interviewer characteristics. All relationships that were significant in Model 2 remain significant in Model 3. The only added variable that has a strong relationship with the outcome is interviewer lives in same district as respondent. The odds of reporting consistent marriage end dates are lower in cases where the interviewer lives in the same district as the respondent.

Marriage-related statistics: MLSFH4/6 vs. RMH

The goal of this paper is to test how misreporting of data collected in retrospective marriage histories affect analyses of marriage. To do this, I compare results of marriage-related statistics using data from MLSFH4/6 to those calculated using reconstructed marriage histories (RMH). Table 10 presents a side-by-side comparison of these results. When I compare statistics from RMH to MLSFH4, I exclude marriages that began after MLSFH4. When I compare RMH to MLSFH6, I include all marriages listed in RMH. Overall, it appears that differences in marriage-related statistics calculated using data from MLSFH4/6 versus RMH are small; however, these differences are statistically significant. As mentioned in the methods section, I use paired tests, rather than unpaired tests, because statistics are being calculated on the same sample.

[Table 10 about here]

Mean age at first marriage is lower using data from RMH than MLSFH4/6. These differences are statistically significant except in the case of women when using data from MLSFH6. Respondents underreport the number of times married and divorced in both MLSFH4 and MLSFH6. Underreporting appears to be a greater problem in MLSFH6 where the mean number of times married and divorced actually decline over time. For instance, according to MLSFH4 and MLSFH6, the mean number of times married among men declines from 1.68 to 1.62. The same pattern is observed for women. Discrepancies also exist in the percentage of respondents ever divorced. While differences are small for MLSFH4, they become strikingly large for MLSFH6. The percentage of men who have ever divorced is 12 percentage points lower

using data from MLSFH6 versus RMH. The gap is slightly smaller, 8 percentage points, for women. The percent ever widowed is slightly lower using MLSFH4/6 than RMH for men. These differences are statistically significant. While this is the case for women using MLSFH4, this does not occur with MLSFH6 data. The percentage ever widowed is higher using MLSFH6 than RMH. This difference, however, is not statistically significant.

Marriage-related statistics calculated from RMH indicate that levels of marriage, divorce, and widowhood are actually higher than what is being reported in MLSFH4 and MLSFH6. Marriages that are being underreported are most likely terminated. Since most terminated marriages end in divorce, such underreporting has a more pronounced effect on divorce-related statistics. Because discrepancies are larger for MLSFH6 than MLSFH4, marriage reports appear to be less reliable in MLSFH6.

Discussion

In this paper, I examine the reliability of retrospective histories using longitudinal data from rural Malawi. Results indicate that a significant amount of underreporting of marriages and inconsistent reporting of marriage-related information exists in this dataset. Marriage analyses are potentially affected because inconsistencies do not appear to be random. Regression analyses show that several individual, marriage, and survey-related characteristics are associated with underreporting marriages and reporting inconsistent marriage dates. Most importantly, underreporting of marriages affects marriage-related statistics, such as number of times married and ever divorced. Means calculated from reconstructed marriage histories indicate that levels of marriage, divorce, and widowhood are higher than actual reports from MLSFH4 and MLSFH6. Since these levels are lower in MLSFH6 than MLSFH4, misreporting appears to be a more serious problem in MLSFH6.

A close look at differences in marriage-related statistics between MLSFH4 and MLSFH6 reveal that underreporting is a greater concern in MLSFH6. For all variables, with the exception of age at first marriage, means are lower in MLSFH6 than in MLSFH4, providing evidence of misreporting. Two possible explanations exist: 1) marriages are being overreported in MLSFH4 or 2) marriages are being underreported in MLSFH6. Since no rational explanation can justify why respondents would report marriages that never took place, the first explanation can be ruled out. The most logical explanation is that marriages are being underreported in MLSFH6. The question now remains: why does underreporting occur in the later survey but not in the earlier survey?

Panel conditioning, which occurs when repeated interviewing affects responses in subsequent surveys, could provide one possible explanation for this finding. MLSFH is a longitudinal survey that has been in existence in rural Malawi since 1998. Although new spouses of respondents are added during each survey wave and samples of adolescents and elderly parents were added in 2004 and 2008, respectively, most respondents have been interviewed in several waves, increasing their familiarity with survey questions. Since 2001, MLSFH has collected marriage histories from its respondents. The format of these marriage histories has, for

the most part, remained stable over time. In each survey wave, interviewers asked respondents to list their current and past spouses[13] and to answer a series of questions about each marriage. With the exception of 2004, they also asked an additional series of questions about their current, previous, and first spouse. Due to their familiarity with the survey format, some respondents may realize that they could answer fewer questions and shorten the survey time by reporting fewer marriages.

To test this possibility, I calculate the percentage of respondents who report inconsistent number of times married across survey waves (Table 11). Each row corresponds to respondents who have participated in MLSFH in every survey wave since the year listed in the rows on the left side of the table. I do not include 1998 because MLSFH did not collect data on the number of times married in that survey year. Thus, 328 men reported number of times married in every survey wave since 2001. Similarly, 447 men reported number of times married in every survey wave since 2004. The number in each box corresponds to the percentage of respondents who reported inconsistent number of times married between the earlier and later survey. Inconsistent reports occur if the number of times married in the earlier survey is greater than that reported in the later survey. Among men, 7.3 percent of respondents interviewed since 2001 reported a decline in the number of times married between 2001 and 2004. While this figure remains the same in 2006, it doubles in 2008 and increases slightly in 2010. A similar pattern is observed among men who have been consistently interviewed since 2004. The difference in reported inconsistencies is minimal among those interviewed since 2006. In the bottom panel of Table 11, I present the same figures for women, which is comparable to the pattern observed among men.

[Table 11 about here]

Results presented here suggest that some respondents may have learned how to condition their responses to the survey. In order to reduce the amount of time spent answering survey questions, respondents may have learned to intentionally omit certain marriages. Since the first survey wave, the length of the survey has increased and become more complex. Over the years, modules have been added to the survey asking respondents to list sexual partners, household members, individuals providing actual/potential transfers, and people with whom they have discussed HIV/AIDS. For each module, respondents usually answer a series of questions about each of these individuals. Furthermore, in 2004, 2006, and 2008, two or more survey teams were sent separately to administer questionnaires and collect biomarkers. Respondents, especially those who have participated since the earliest waves, may perceive limited benefits for the amount of time spent participating in MLSFH. Although they always have the option of refusing to participate, they may not want to be impolite.

Several limitations of this analysis are worth mentioning. First, it is likely that some respondents are consistently underreporting certain marriages. This analysis is unable to capture such marriages. Thus, it is highly likely that the true number of marriages is higher than those

[13] In 2004, MLSFH asked respondents to list their first five spouses.

listed in the reconstructed marriage histories. Second, this analysis is limited to examining the reliability of retrospective marriage histories. A better test of data quality is to examine the accuracy of marriage reports by comparing them to official sources, such as marriage certificates or vital registry systems. Unfortunately, this is not possible in rural Malawi since civil marriages are not the norm.

Table 1.Matching process, by gender, MLSFH4 and MLSFH6

	Men	Women
Number of marriages reported in MLSFH4	1225	1593
Number of marriages reported in MLSFH6	1109	1480
Difference (MLSFH4-MLSFH6)	116	113
Match rates		
% marriages reported in MLSFH4 also reported in MLSFH6	84.7	89.5
% marriages reported in MLSFH6 also reported in MLSFH4	93.6	96.3

Table 2. Reconstructed marriage histories (RMH)

Items listed in RMH

1. Marriage order
2. Year marriage began
3. Status
   - Still married
   - Separated/divorced
   - Widowed
4. Year marriage ended

Table 3. Match statistics of reconstructed marriage histories (RMH)

	Men	Women
Marriage-level		
Unmatched marriages (%)	18.8	12.9
Number of marriages	1369	1728
Individual-level		
Did not report at least one marriage (%)		
All respondents	26.2	16.3
Married more than once[a]	51.8	46.0
Did not report multiple marriages[b] (%)	22.5	15.6
Number of respondents	729	1138

[a] Refers to respondents married more than once by 2006 survey

[b] Among those who did not report at least one marriage

Table 4. Reported number of times married in MLSFH4 and MLSFH6, Men

		2010							
		1	2	3	4	5	6	7	Total
2006	1	337	51	6	0	0	0	0	394
	2	**58**	137	19	4	2	0	0	220
	3	**13**	**23**	36	9	1	1	1	84
	4	**8**	**4**	**3**	5	1	1	0	22
	5	**1**	0	**3**	**1**	2	0	0	7
	6	0	0	0	0	0	1	0	1
	7	0	0	0	0	0	0	0	0
	8	0	0	0	0	0	0	0	0
	9	0	**1**	0	0	0	0	0	1
	Total	417	216	67	19	6	3	1	729

Table 5. Reported number of times married in MLSFH4 and MLSFH6, Women

		2010							
		1	2	3	4	5	6	7	Total
2006	1	733	49	3	0	0	0	0	785
	2	**70**	165	32	2	1	0	0	270
	3	**12**	**21**	31	5	0	0	0	69
	4	**1**	**2**	**4**	3	0	0	0	10
	5	**2**	0	0	0	0	0	1	3
	6	0	0	0	**1**	0	0	0	1
	Total	818	237	70	11	1	0	1	1138

Table 6a. Current or unmatched marriage, risk ratios relative to risk of matched marriage, men, MLSFH4 and MLSFH6

	Model 1		Model 2		Model 3	
	Current	**Unmatched**	**Current**	**Unmatched**	**Current**	**Unmatched**
Individual Characteristics						
Age	0.90**	1.01	0.91*	1.00	0.77***	0.89+
Age squared	1.00**	1.00	1.00**	1.00	1.00***	1.00+
Region of residence						
Central (ref)	---	---	---	---	---	---
South	1.01	1.05	0.95	1.26	0.88	1.02
North	1.10	0.81	1.31	1.23	2.08*	1.19
Completed five or more grades of schooling	1.05	0.98	1.00	1.00	1.08	1.31
Inconsistent reporting of:						
Level of education	1.11	1.90*	1.01	1.60	2.24*	3.44**
Number of children ever born	1.04	1.55	1.24	1.56	1.02	2.25*
Number of sexual partners ever	0.95	1.24	1.02	1.26	0.73	0.96
Marriage Characteristics						
Marriage order						
First (ref)	---	---	---	---	---	---
Second	0.74	0.89	0.67+	0.92	0.71	1.16
Third or higher	0.94	1.77	0.77	1.71	1.17	2.70*
Years since marriage began	0.92***	1.03*	0.91***	1.02	0.91***	1.02
Short duration marriage	0.09***	3.41***	0.10***	3.51***	0.06***	2.99**
Survey Characteristics						
Interviewer knows respondent's family (MLSFH4)			0.89	0.68	0.65	0.84
Degree of cooperation (MLSFH4)						
Good (ref)			---	---	---	---
Very good			1.15	1.08	1.35	1.11
Average/bad			1.27	1.30	0.98	1.11
Degree of cooperation (MLSFH6)						
Good (ref)			---	---	---	---
Very good			1.05	1.01	1.21	1.36
Average/bad			0.77	1.25	0.70	1.22
Length of survey time (MLSFH6)						
Middle (ref)			---	---	---	---
Short			0.88	0.88	0.90	0.99
Long			1.18	1.03	1.47	1.32
Interviewer Characteristics (MLSFH6)						
Age			0.74	1.05	0.76	0.93
Age squared			1.01	1.00	1.00	1.00
Male			1.61*	1.65+	1.31	1.62
Ever married			0.93	1.18	0.83	1.29
Has prior interviewing experience			0.78	0.53*	0.83	0.66
Lives in same district as respondent			0.81	1.07	0.78	0.96
Interviewer Characteristics (MLSFH4)						
Age					0.87	1.21
Age squared					1.00	1.00
Male					1.56	1.68
Ever married					0.65	1.60
Has prior interviewing experience					2.37**	1.19
Lives in same district as respondent					0.65+	0.84
Number of marriages	1,185		1,019		572	
Pseudo R2	0.190		0.198		0.246	

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Table 6b. Current or unmatched marriage, risk ratios relative to risk of matched marriage, women, MLSFH4 and MLSFH6

	Model 1		Model 2		Model 3	
	Current	**Unmatched**	**Current**	**Unmatched**	**Current**	**Unmatched**
Individual Characteristics						
Age	0.92*	1.16**	0.92+	1.20***	0.92	1.17*
Age squared	1.00	1.00***	1.00	1.00***	1.00	1.00*
Region of residence						
Central (ref)	---	---	---	---	---	---
South	0.80	1.30	0.75	1.21	0.83	1.29
North	1.64**	1.33	1.92**	1.34	1.53	1.29
Completed five or more grades of schooling	1.32	1.07	1.23	1.34	1.50	1.48
Inconsistent reporting of:						
Level of education	1.09	1.40	1.14	1.58+	1.19	1.61
Number of children ever born	1.12	1.09	1.17	1.12	1.47	1.11
Number of sexual partners ever	1.30+	3.48***	1.17	3.64***	1.08	2.86***
Marriage Characteristics						
Marriage order						
First (ref)	---	---	---	---	---	---
Second	1.06	1.02	1.10	1.09	0.97	0.73
Third or higher	0.93	1.06	0.94	0.91	0.91	0.67
Years since marriage began	0.94***	1.01	0.94***	1.01	0.95*	0.99
Short duration marriage	0.12***	4.82***	0.11***	4.61***	0.11***	4.63***
Survey Characteristics						
Interviewer knows respondent's family (MLSFH4)			0.46**	0.64	0.72	0.80
Degree of cooperation (MLSFH4)						
Good (ref)			---	---	---	---
Very good			0.96	1.15	1.08	1.13
Average/bad			0.91	0.79	1.21	0.62
Degree of cooperation (MLSFH6)						
Good (ref)			---	---	---	---
Very good			1.34	0.95	1.20	0.70
Average/bad			1.10	0.86	1.08	0.76
Length of survey time (MLSFH6)						
Middle (ref)			---	---	---	---
Short			1.12	1.51+	1.05	1.53
Long			1.01	1.16	1.04	1.16
Interviewer Characteristics (MLSFH6)						
Age			0.94	0.82	0.90	1.06
Age squared			1.00	1.00	1.00	1.00
Male			1.19	1.30	1.29	1.72+
Ever married			0.97	1.01	0.89	0.68
Has prior interviewing experience			0.93	1.62+	1.23	1.23
Lives in same district as respondent			0.95	1.29	1.11	1.47
Interviewer Characteristics (MLSFH4)						
Age					0.71	0.62
Age squared					1.01	1.01+
Male					1.06	1.14
Ever married					1.04	0.66
Has prior interviewing experience					1.09	1.04
Lives in same district as respondent					1.16	1.21
Number of marriages	1,554		1,317		740	
Pseudo R2	0.203		0.216		0.219	

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Table 7. Discrepancies in matched marriages in MLSFH4 and MLSFH6, by gender

Variables	Men	Women
1. Status of marriage discrepancies for matched marriages[a]		
1.1. % marriages reporting the same status in MLFSH4 and MLSFH6	98.3	96.7
2. Marriage start date discrepancies for matched marriages[b] (MLSFH4-MLSFH6 date in years)		
2.1. Median date discrepancy	0	0
2.2. Median date discrepancy (absolute value)	1	1
2.3. Interquartile range date discrepancy	1	1
Percentage of reported dates for matched marriages		
2.4. MLSFH4 precedes MLSFH6	24.1	22.7
2.5. Same	44.1	45.2
2.6. MLSFH4 follows MLSFH6	31.9	32.0
Date discrepancy and telescoping: mean quartic root date discrepancy		
2.7. MLSFH4 precedes MLSFH6	1.27	1.31
	(0.30)	(0.33)
2.8. MLSFH6 follows MLSFH4	1.30	1.36
	(0.34)	(0.37)
2.9. Difference (row 2.7 - 2.8)	-0.02	-0.05
(standard error)	(0.03)	(0.03)
3. Marriage end date discrepancies for matched marriages[c] (MLSFH4-MLSFH6 date in years)		
3.1. Median date discrepancy	0	0
3.2. Median date discrepancy (absolute value)	1	2
3.3. Interquartile range date discrepancy	3	4
Percentage of reported dates for matched marriages		
3.4. MLSFH4 precedes MLSFH6	35.6	36.6
3.5. Same	30.7	28.4
3.6. MLSFH4 follows MLSFH6	33.7	35.0
Date discrepancy and telescoping: mean quartic root date discrepancy		
3.7. MLSFH4 precedes MLSFH6	1.37	1.32
	(0.33)	(0.32)
3.8. MLSFH4 follows MLSFH6	1.29	1.38
	(0.36)	(0.36)
3.9. Difference (row 3.7-3.8)	0.08	-0.06
(standard error)	(0.06)	(0.04)
Number of matched marriages	1038	1425

Note: Standard deviations are in parentheses unless otherwise noted.

[a]Excludes 13 men and 23 women who did not report status in both 2006 and 2010. Excludes marriages that ended between 2006 and 2010.

[b]Excludes 28 men and 82 women who did not report marriage start date in both 2006 and 2010.

[c]Excludes 15 men and 54 women who did not report marriage end date in both 2006 and 2010.

Table 8. Odds of reporting consistent marriage start date, men and women, MLSFH 4 and MLSFH6

	Men			Women		
	Model 1	**Model 2**	**Model 3**	**Model 1**	**Model 2**	**Model 3**
Individual Characteristics						
Age	1.05	1.03	1.01	0.96	0.96	0.94
Age squared	1.00	1.00	1.00	1.00	1.00	1.00
Region of residence						
Central (ref)	---	---	---	---	---	---
South	0.46***	0.42***	0.53*	0.47***	0.40***	0.42***
North	0.76	0.82	1.20	0.98	0.88	0.79
Completed five or more grades of schooling	1.46*	1.50*	1.50	1.97***	2.03***	1.91**
Inconsistent reporting of:						
Level of education	1.10	1.26	1.74+	1.16	1.30	1.71+
Number of children ever born	1.06	1.05	0.75	0.51**	0.50**	0.62
Number of sexual partners ever	1.08	1.06	1.13	0.67*	0.69*	0.83
Marriage Characteristics						
Marriage order						
First (ref)	---	---	---	---	---	---
Second	0.53***	0.53**	0.52*	0.72+	0.68+	0.71
Third or higher	0.51*	0.61+	0.51+	0.88	0.97	0.96
Years since marriage began	1.01	1.01	1.01	1.01	1.02	1.01
Short duration marriage	0.93	0.85	0.83	0.62**	0.63*	0.58*
Status of marriage						
Still married	---	---	---	---	---	---
Divorced	0.80	0.81	1.13	0.75+	0.75	0.84
Widowed	0.52+	0.35*	0.38	0.64+	0.58*	0.68
Survey Characteristics						
Interviewer knows respondent's family (MLSFH4)		0.98	1.60		1.07	1.29
Degree of cooperation (MLSFH4)						
Good (ref)		---	---		---	---
Very good		0.86	0.83		0.95	1.26
Average/bad		0.94	0.89		0.96	1.22
Degree of cooperation (MLSFH6)						
Good (ref)		---	---		---	---
Very good		1.01	1.01		1.10	1.01
Average/bad		1.01	1.11		0.68*	0.59*
Length of survey time (MLSFH6)						
Middle (ref)		---	---		---	---
Short		0.64*	0.68		1.12	1.16
Long		0.95	0.90		1.00	0.88
Interviewer Characteristics (MLSFH6)						
Age		0.75+	0.92		0.81	0.87
Age squared		1.00	1.00		1.00	1.00
Male		1.06	0.95		1.07	0.98
Ever married		1.24	1.13		1.43	0.97
Has prior interviewing experience		1.67*	1.38		1.16	1.15
Lives in same district as respondent		1.02	1.28		0.98	1.00
Interviewer Characteristics (MLSFH4)						
Age			0.84			1.24
Age squared			1.00			1.00
Male			0.57			1.17
Ever married			1.11			1.35
Has prior interviewing experience			0.90			0.89
Lives in same district as respondent			1.02			0.97
Number of marriages	927	804	437	1,279	1,089	602
Pseudo R2	0.0558	0.0793	0.0944	0.107	0.121	0.121

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Table 9. Odds of reporting consistent marriage end date, men and women, MLSFH 4 and MLSFH6

	Model 1	Model 2	Model 3
Individual Characteristics			
Age	0.91+	0.89*	0.77***
Age squared	1.00*	1.00+	1.00***
Male	1.21	1.18	1.26
Region of residence			
Central (ref)	---	---	---
South	0.68	0.90	0.73
North	1.09	1.18	1.39
Completed five or more grades of schooling	1.95*	2.25**	2.54*
Inconsistent reporting of:			
Level of education	0.79	0.70	0.82
Number of children ever born	0.90	0.78	0.72
Number of sexual partners ever	0.78	0.75	0.66
Marriage Characteristics			
Marriage order			
First (ref)	---	---	---
Second	1.18	1.32	1.43
Third or higher	0.80	1.03	0.91
Years since marriage began	0.98	0.99	1.02
Short duration marriage	0.45**	0.45**	0.45+
Ended in widowhood	1.62*	1.36	1.41
Survey Characteristics			
Interviewer knows respondent's family (MLSFH4)		1.14	1.56
Degree of cooperation (MLSFH4)			
Good (ref)		---	---
Very good		1.08	0.98
Average/bad		0.53+	0.24*
Degree of cooperation (MLSFH6)			
Good (ref)		---	---
Very good		0.62	0.73
Average/bad		1.45	1.84
Length of survey time (MLSFH6)			
Middle (ref)		---	---
Short		0.90	1.43
Long		0.87	0.86
Interviewer Characteristics (MLSFH6)			
Age		1.07	0.97
Age squared		1.00	1.00
Male		1.63+	1.85+
Ever married		1.79+	2.47+
Has prior interviewing experience		1.40	1.26
Lives in same district as respondent		0.76	0.80
Interviewer Characteristics (MLSFH4)			
Age			1.20
Age squared			1.00
Male			0.58
Ever married			1.64
Has prior interviewing experience			2.03
Lives in same district as respondent			0.38*
Number of marriages	530	462	273
Pseudo R2	0.0798	0.114	0.155

*** p<0.001, ** p<0.01, * p<0.05, + p<0.10

Table 10. Marriage-related statistics (means) using data from MLSFH4, MLSFH6, and RMH

	Men						Women					
Variables	**MLSFH4**	**RMH**		**MLSFH6**	**RMH**		**MLSFH4**	**RMH**		**MLSFH6**	**RMH**	
Age at first marriage	22.17	21.96	***	22.40	21.96	***	17.83	17.69	***	17.79	17.69	
	(4.14)	(4.15)		(4.70)	(4.15)		(3.52)	(3.34)		(3.72)	(3.34)	
Number of times married	1.68	1.78	***	1.62	1.88	***	1.40	1.45	***	1.37	1.52	***
	(0.92)	(1.02)		(0.89)	(1.07)		(0.68)	(0.74)		(0.67)	(0.81)	
Number of times divorced	0.47	0.53	***	0.43	0.64	***	0.42	0.45	***	0.39	0.54	***
	(0.80)	(0.87)		(0.76)	(0.94)		(0.72)	(0.76)		(0.72)	(0.84)	
Ever divorced	0.35	0.37	***	0.30	0.42	***	0.34	0.35	*	0.29	0.37	***
	(0.48)	(0.48)		(0.46)	(0.49)	***	(0.47)	(0.47)		(0.45)	(0.48)	
Ever widowed	0.08	0.09	**	0.08	0.10	**	0.10	0.11	*	0.13	0.12	
	(0.27)	(0.28)		(0.27)	(0.30)		(0.30)	(0.31)		(0.33)	(0.33)	
Number of respondents	729	729		729	729		1138	1138		1138	1138	

*** p<0.001, ** p<0.01, * p<0.05

Note: Standard deviations are in parentheses. Paired t-tests are used to calculate mean age at first marriage, number of times divorced, ever divorced, and ever widowed. Wilcoxon rank-sum tests are used to calculate number of times married and number of times divorced.

Table 11. Percentage of respondents who report inconsistent number of times married across survey waves, MLSFH

Men

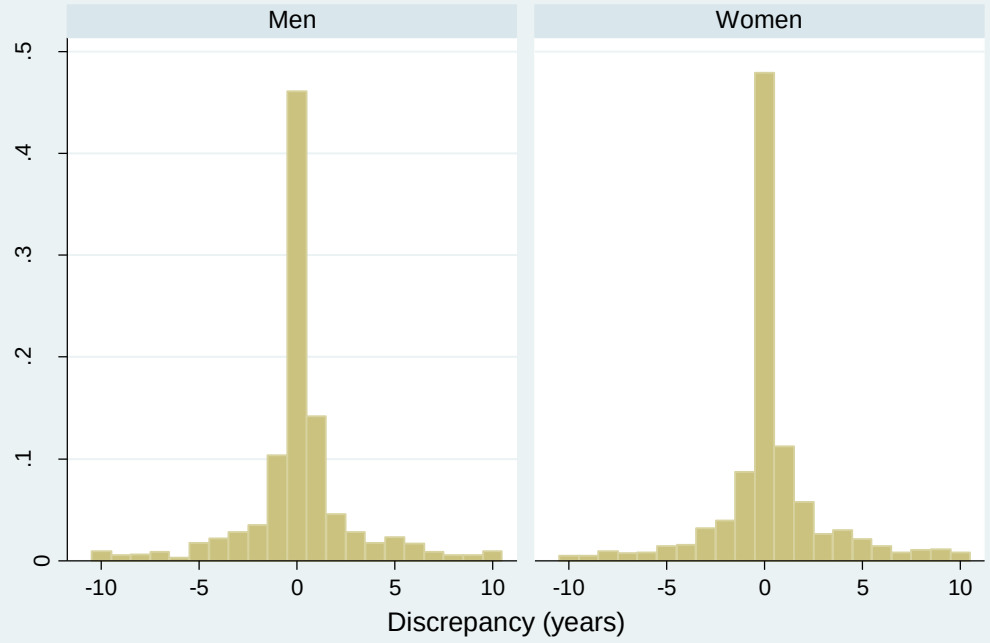
		Later Survey				
		2004	**2006**	**2008**	**2010**	**Total**
Earlier Survey	**2001**	7.3	7.3	14.6	15.2	328
	2004	-	11.6	15.9	17.5	447
	2006	-	-	14.1	15.1	608
	2008	-	-	-	10.5	608

Women

		Later Survey				
		2004	**2006**	**2008**	**2010**	**Total**
Earlier Survey	**2001**	9.9	10.2	15.3	15.4	629
	2004	-	7.3	11.1	11.6	765
	2006	-	-	10.6	10.1	976
	2008	-	-	-	9.2	976

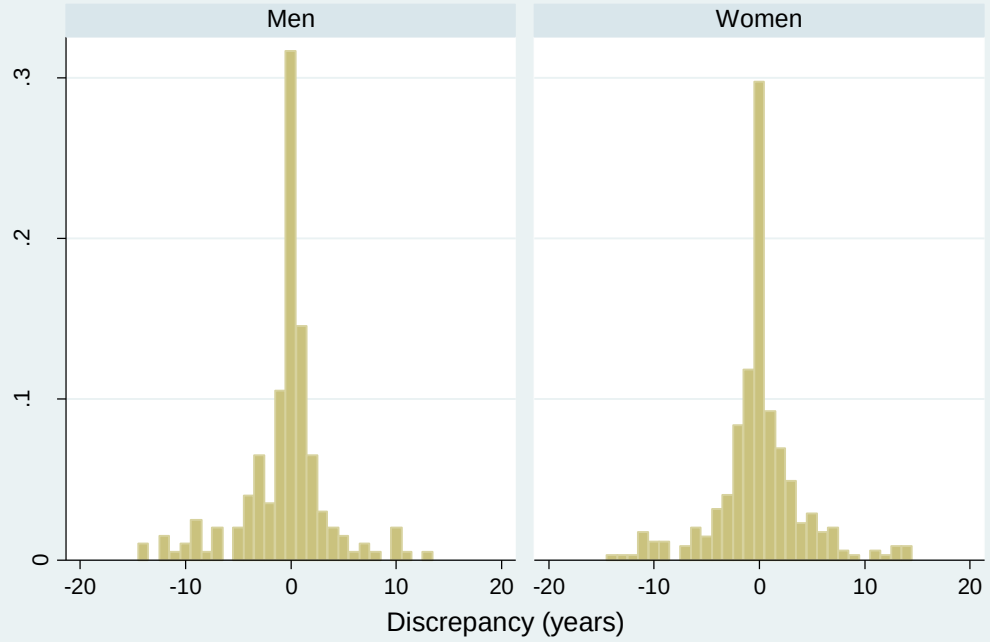
Note: Inconsistent reporting of number of times married refers to instances where a higher number of marriages was reported in the earlier survey than in the later survey.

Figure 1. Discrepancies in Marriage Start Dates (MLSFH4 - MLSFH6)



Note: Restricted to marriages where marriage start date was reported in both MLSFH4 and MLSFH6.

Figure 2. Discrepancies in Marriage End Dates (MLSFH4 - MLSFH6)



Note: Restricted to terminated marriages where marriage end date was reported in both MLSFH4 and MLSFH6.

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