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Union formation and first birth in Moshi, Tanzania

Short title: Union formation in Moshi, Tanzania

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Abstract

Age at first union is increasing throughout much of sub-Saharan Africa (ORC Macro 2005) at the same time as couples are not universally waiting for marriage before their first sex (Bledsoe and Cohen 1993). As a result, there may be a changing pattern of age at first marriage and age at first birth in the region (Calvès 1999). While most research on the sequences leading to union formation comes from West Africa (Meekers 1992; Calvès 1999), we assess the effect of a premarital first birth on young women's entrance into a first union in an urban area in East Africa: Moshi, Tanzania. The data stem from the 2002-2003 Moshi Infertility Survey. Women who have spent less than a year in single motherhood are significantly more likely to enter into a first union than childless women. Women who have been single mothers for five or more years (about two-thirds of women with a premarital birth) are significantly less likely to enter into a first union as women without children. Finally, we find evidence that women with children prior to entering a union have higher rates of HIV at survey interview.

KEY WORDS: nuptiality, fertility, premarital births, STIs/HIV risk behavior, sub-Saharan Africa.

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Introduction

Age at first union is increasing throughout much of sub-Saharan Africa (Bledsoe and Cohen 1993; Meekers 1994a; ORC Macro 2005). At the same time as age at first union is increasing, couples do not universally wait for marriage before their first sex. Consequently, there is an increase in nonmarital first births in the region (Bledsoe and Cohen 1993). As a result, there is much interest surrounding the possibility of a changing pattern of age at first marriage and age at first birth in sub-Saharan Africa as well as the consequences of the new pattern (Bledsoe and Cohen 1993; Calvès 1999). If women with premarital births were subject to marginalization in the marriage market, with a changing pattern of union formation and onset of childbearing an increasing proportion of young women would face difficulties in forming unions. However, while much of the literature focuses on the marital prospects of women with premarital births, these women may also be a group particularly vulnerable to reproductive health problems such as sexually transmitted infections (STIs) and HIV/AIDS.

Two competing hypotheses guide most analysis of the changing patterns of union formation and first births: (1) that the changes are a result of the breakdown of traditional controls or (2) that the changes are a result of rational decisions made for economic gain (Meekers 1994b). Meekers' multicountry analysis of sexual initiation and premarital childbearing in sub-Saharan Africa suggests that changes in the social context of adolescent sexual behaviour and childbearing, not a lessening of sexual morals, have produced the changing pattern of union formation and first births (1994).

While national level increases in the age at first marriage are evident in most of sub-Saharan Africa, a later age at first marriage is patterned along common social lines (Bledsoe and Cohen 1993). The increase in age at first marriage is more common among

urban and more highly educated individuals. As educational attainment becomes an important commodity in the labour force, couples may prefer to postpone marriage until they have completed their education (Gage-Brandon and Meekers 1993). In addition, the improved status of women, through education and labour force participation, may increase age at first marriage by changing women's attitudes towards traditional marriage (Mason 1987; Meekers 1993). Women's increasing economic independence and legal equality are main aspects of the global changes in marriage that set current times apart from the past (Coontz 2004). However, economic independence, a key factor if a young woman is to postpone marriage, is not available to all, thus resulting in the pattern of "professional, better educated, urban, and wealthy women" (Meekers 1993: p35) being more likely to postpone marriage.

Many studies addressing marriage as a process, often involving bridewealth, a first birth and a ceremony, focus on West Africa. For example, Meekers (1992) demonstrates that a first birth is an important step in the union formation process in Côte d'Ivoire. In situations where a first birth is not a formal step in the marriage process, a first birth can still accelerate the process or prove a young woman's fertility (Karanja 1994; Bennett, Bloom, and Miller 1995; Oppong and Wery 1995; Meekers and Calvès 1997; Calvès 1999).

Calvès' (1999) analysis of the likelihood of marriage quantifies the impact that premarital childbearing has on young women's first marriage in the West African country of Cameroon. While a first birth is associated with decreased odds of marrying, she finds that the amount of time that has elapsed since the birth is an important factor. Young women who have been single mothers for a year or less are 1.5 times more likely to enter a union, while those who have been single mothers for four or more years are 0.6 times as

likely to enter a union compared to women with no children at the age of marriage. Calvès concludes if a first birth is followed quickly by marriage it may function to reduce the stigma of premarital pregnancy or to act as a first step in the union formation process.

Given the potential costs associated with a premarital first birth, economic models of cost-benefit analysis predict that women would be motivated to avoid a first premarital birth—through abstinence, contraception, or abortion. As Robinson (1997) argues, such economic models ignore the jointness of demand—sexual behaviour is a means for attaining both pleasure and children. While Meekers (1994) finds evidence that age at first sex has moderately increased across all seven countries included in his analysis, abstinence may be too difficult a means to sustain in order to avoid a premarital first birth. While many youth abstain from premarital sex, the percent of never married young women aged 15 to 24 who reported having had sex in the last 12 months is considerable throughout East Africa. The most recent estimates from the Demographic and Health Surveys in the region show the percent of women reporting premarital sex included 21 percent in Kenya women (2003 DHS), 27 percent in Malawi (2000 DHS), 54 percent in Mozambique (2003 DHS), 33 percent in Tanzania (2003 HIV/AIDS Indicator Survey), 27 percent in Uganda (2000/2001 DHS), 31 percent in Zambia (2000/2001 DHS), and 15 percent in Zimbabwe (1999) (ORC Macro 2005). In each of these countries, with the exception of Zambia, a higher percent of never married women in urban areas reported having had sex in the past twelve months than those in rural areas.

The use of contraception may also be a challenging means to avoid a premarital first birth. The barriers to contracepting include the social cost of breaking social rules or preferences, the psychic cost of fears and anxiety surrounding contracepting and the method of contracepting, and the economic cost of money or time spent to obtain

contraception (Robinson 1997). In addition, some forms of contraception require both partners to contracept (Davis and Blake 1956). Finally, while highly effective at preventing premarital first births, abortion may also be a problematic means to avoid a premarital first birth. Abortion is illegal in most countries in sub-Saharan Africa (United Nations 2002).

While much of the research on first births as a step in the marriage process focuses on West Africa, there is wide variation in the occurrence of nonmarital births throughout the African continent. For example, 42 percent of Batswana, 20 percent of Kenyan, 9 percent of Zimbabwean, 2 percent of Burundian, 9 percent of Ghanaian, and 34 percent of Liberian never married young women aged 15 to 24 in the late 1980's had given birth (Gage-Brandon and Meekers 1993). Given that many never married women outside of West Africa have had a first birth, it is important to expand the research on age at first union and age at first birth beyond West Africa. Changes in age at marriage and age at first birth are likely to first be evident among those living in urban areas and those with higher levels of education. As modernization progresses, changes first seen in more urban areas are likely to be precursors of changes to come in the rest of the region. This analysis steps outside of West Africa and focuses on one urban district in the East African country of Tanzania—Moshi.

Background: Marriage, contraception, and childbearing in Tanzania

While many youth abstain from pre-marital sex in Tanzania, a quarter of youth aged 15 to 19 and half of youth aged 20 to 24 reported premarital sex in the 2003-2004 Demographic and Health Survey (STAT Compiler www.measuredhs.com), suggesting that abstinence is not a long term choice for young women intending to avoid a premarital pregnancy. The obstacles to contraceptive use may be particularly high in

Tanzania for single women and for women without children: until 1994 contraception was limited to child spacing and stopping (women did not use contraception to delay age at onset of childbearing) and was therefore largely limited to married couples (Silberschmidt and Rasch 2001). The contraceptive prevalence rate for all nulliparous women is 3 percent (Larsen 1997). Finally, abortion is illegal in Tanzania except to save the mother's life (Rahman, Katzive, and Henshaw 1998); (United Nations 2002)). Illegal abortions are often preformed by individuals who are unskilled, resulting in high levels of morbidity (Silberschmidt and Rasch 2001). In the Kilimanjaro region of Tanzania, one study associates a fifth of maternal deaths with abortions (United Nations 2002). Given the legal status and health risks associated with illegal abortions in Tanzania, it is likely that young women do not see abortion as a practical means to avoid a first birth. As such, despite the potential costs associated with premarital first births, the difficulties of continued abstinence, contraceptive use, or abortion may be even greater for Tanzanian young women.

Age at first marriage is increasing in Tanzania (Hinde and Mturi 2000). Consistent with the model of education as increasing women's propensity to delay marriage, the increases in age at first marriage are patterned along educational lines. On the national level, the median age at first marriage remained stable at 19.0 from 1992 to 1999 (ORC Macro 2005). There was no substantial change among young women with no or primary education, however, there was a substantial increase in age at first marriage among those with secondary or higher schooling (from 23.0 in 1992 to 24.3 in 1999).[i]

At the same time as age at first marriage has increased, on the national level the median age at first sex appears to have decreased slightly among young women aged 20 to 24 from 17.3 years in 1992 to 16.9 years in 1999 (ORC Macro 2005). While there has

been no substantial change among young women aged 20 to 24 with no education (from 16.1 in 1992 to 16.2 in 1999), age at first sex among those with primary schooling decreased from 17.4 in 1992 to 16.9 in 1999 and among those with secondary or higher age at first sex decreased from 20.0 in 1992 to 19.2 in 1999 (ORC Macro 2005).

While age at first marriage and age at first birth are both increasing, the median age at first birth is increasing more slowly, resulting in less than a one year gap between age at first marriage and age at first birth among Tanzanian women born in the 1970's (Hinde and Mturi 2000). However, the increase in premarital sexual activity has not greatly affected the percent of births that are premarital due to increased contraceptive use (Lejeune and Hinde 1999, cited in (Hinde and Mturi 2000).

The trends in median age at first birth and median age at first marriage differ by rural and urban residence (ORC Macro 2005). Median age at first birth is slightly higher in urban areas than in rural areas (19.5 years among urban women and 18.9 among rural women aged 25-49 in 1999). While the median age at first birth in urban areas has increased from 18.5 years in 1992 to 19.5 years in 1999, the median age at first birth in rural areas has not changed from 1992 to 1999, remaining at 18.9 years. There has been a slightly larger increase in median age at first marriage in urban areas than in rural areas from 1992 to 1999 (increasing from 18.3 years in 1992 to 18.8 years in 1999 for urban areas compared with increasing from 17.8 years in 1992 to 18.0 years in 1999 for rural areas). Given the larger changes in the age at first birth and age at first marriage in urban Tanzania than in rural Tanzania, it is particularly germane to study an urban population.

Moshi is the capital of the Kilimanjaro Region in Tanzania. Although historically predominantly Chagga, today, Moshi is a multi-ethnic town (Setel 1999). The total fertility rate in Moshi is 2.9 measured from the 2002-2003 Moshi Infertility Survey (the

data used in this study) which is much lower than the total fertility rate in the whole of Tanzania of 5.6 measured from the 1999 Demographic and Health Survey (ORC Macro 2005; Larsen and Hollos 2005). The increased age at first marriage appears to be concurrently timed with the transition from a more traditional marriage to a more companionate marriage among the Pare of rural Kilimanjaro (Larsen and Hollos 2003). While parents often arrange traditional marriages, companionate marriages are a result of the couple's own decision to marry. In-depth interviews among the Pare in rural Kilimanjaro suggest that it may become more difficult for a woman to marry if she has a child (Larsen and Hollos 2003).

Data and Methods

Our data stem from the 2002-2003 Moshi Infertility Survey (Larsen et al. 2005). The survey is a representative household survey of the Moshi urban district (Moshi). The survey included 2019 women aged 20 to 44. Data were collected using a two-stage sampling design. In the first stage, in each ward, enumeration areas were selected proportional to the number of enumeration areas in the ward. In the second stage 18 households were randomly selected from each enumeration area. All eligible women in the selected household were interviewed. Up to three attempts were made to interview each eligible individual, after which the case was classified as missing. Informed consent was attained from both the respondent answering the household interview and each individual eligible for an individual interview. The questionnaire included questions on union formation, fertility, family planning, symptoms of sexually transmitted infections (STIs), and healthcare seeking and treatment for infertility and STIs.

After the individual interview was completed the interviewer offered the respondent STI/HIV counselling and requested consent to obtain blood and/or urine

samples for laboratory testing for STIs/HIV. Couples identified in the questionnaire as infertile were offered medical exams. Respondents were informed that they could choose to have some or all of the tests offered.

The 2002-2003 Moshi Infertility Survey was run by a multidisciplinary team including researchers from the Kilimanjaro Christian Medical Centre (KCMC) in Moshi, Tanzania, National Bureau of Statistics (NBS) in Dar es Salaam, Tanzania, Centers for Disease Control and Prevention (CDC) in Atlanta, U.S.A., and Harvard School of Public Health (HSPH) in Boston, U.S.A. This research project was approved by the Harvard School of Public Health IRB (HSC Protocol # 0108ACOM), the University of Maryland IRB, the Kilimanjaro Christian Medical Centre Ethics Committee and the Research & Ethical Clearance of the Tanzanian National Institute for Medical Research.

The present study was limited to the 1,891 women who responded to all questions pertinent to this analysis.[ii] Analysis was conducted in STATA 8 with the use of survey weights. As likelihood ratio tests are not valid for logistic regressions with survey weights (STATA Corp 2003), model fit was initially tested using standard logistic regressions without weights yet controlling for ward (not shown). After establishing the best model for the analysis, the data were weighted. The magnitude of the relationship between the independent variables and entrance into a first union did not differ substantially between the weighted and unweighted data. The weighted results are presented.

As discussed above, entrance into a marriage in Africa is a process and capturing the date that the marriage begins is often difficult in quantitative surveys. Further, often the line between marriage and cohabitation is nearly indistinguishable. Demographers studying Africa often use the category "in union" to include both those who are married

as well as those who are cohabiting. Given the difficulty in precisely identifying the beginning of a marriage, use of either the age at first cohabitation or the age of marital ceremony to mark the beginning of a union provides the necessary conceptual clarity (Bledsoe and Cohen 1993). The analysis is of age at first union, whether the union began with cohabitation or a ceremony. As such, in the discussion of the results the more general term "union formation" is used.

The analysis began by comparing young women's socio-demographic characteristics and HIV status[iii] at survey date by their motherhood status using the Pearson χ^2 test. Motherhood status was categorized as not having a first birth before entering a union, having a first birth and entering a union in the same year, and having a first birth prior to the year a union was entered. Next, the probability of first union by age and the probability of first birth by age were calculated using the actuarial life table method. The findings for age at entry into first union and first birth were stratified by birth cohort and graphed. The median age at first union and median age at first birth are presented by socio-demographic characteristics.

The factors associated with age at first union were analysed using discrete time logistic regression models to estimate the odds ratios (OR) and 95% confidence intervals (CI). An event history file of person-year records was created for this analysis (Allison 1984). In this file, each age that the woman was observed prior to entering into a union was a separate observation. Each unit of observation included the woman's sociodemographic characteristics, parity at the age of observation, years since first birth, and whether or not she has entered her first union. Women were followed from age 12 until the age at first union, age at survey year, or age 30.[iv]

Our main interest in this analysis was whether a premarital first birth had an effect on the odds of a first union. Respondents were asked if they were married, living with a man, or single at the time of survey interview. Those who were single were asked if they ever had married or lived with a man. Women who had ever married or lived with a man were asked the age at which they began their first union. The data do not provide information about women currently married who began their first union with cohabitation.

Model 1 includes the woman's age of observation and motherhood status. Model 2 adds controls for education, religion, tribe, cohort, and age at menarche. In models 1 and 2, women's parity is coded as a time-varying variable reflecting the woman's parity at each age.[v] In order to explore whether the effect of a first birth is time-dependent, in model 3 we create a series of dichotomous variables to indicate the duration of a woman's single motherhood. This duration is coded as having a birth in the same year as the index-year (n=295), a birth 1 to 2 years prior to the index-year (n=88), a birth 3 to 4 years prior to the index year (n=37), or a birth 5 or more years prior to the index year (n=208).

While we have data on the year and month of first birth and year of first union, we do not have detailed information on the month of first union which would allow us to exactly distinguish whether a birth in the same year as union formation was conceived before or after the union began.[vi] The 295 women reporting a birth in the same year as their first union were coded as spending less than a year as single mothers.

Age at first union is often related to various socio-demographic characteristics (Bledsoe and Cohen 1993). We expect that women with higher education, women who are Christians, women who have not yet reached menarche, and women born after 1965

entered unions at later ages. In this analysis, women's level of education was categorized as none/primary, secondary, or higher than secondary. Religion was categorized as Muslim or Christian (includes the 39.6% Catholic, the 25.5 % Protestant, and the 4.1% other). While Moshi is a multi-ethnic town, half of the sample was Chagga (51.7%) and an eighth was Pare (12.4%). As such, tribe was coded Chagga, Pare, or other. To control for the possible stigma against forming a union before reaching menarche, we added a time-varying variable for whether or not the woman had reached menarche by the index year.[vii] In table 1, HIV status at survey by motherhood status at first union is presented. HIV is a fatal sexually transmitted infection for which there is no cure. As the timing of infection in relation to union formation cannot be established, the causal ordering is unknown. However, the vast majority of women who tested positive for HIV were unaware of their serostatus.

Results

Socio-demographic characteristics by motherhood status at first union

Table 1 shows the weighted proportion distribution of socio-demographic characteristics by motherhood status at first union. Approximately two-thirds of the women in the sample did not have a first birth before entering into a first union (0.65). Roughly equal proportions of women reported that they had a first birth the same year that they entered their first union (0.16) or that they had a child a year or more before entering a union (0.18). Motherhood status at the time of first union varied significantly by birth cohort, age, marital status, age at menarche, use of contraception prior to first birth, and HIV status at survey.

(Table 1 about here)

While there was no clear pattern of motherhood status by age at survey date, women aged 20 to 24 had the lowest proportion of women who had a first birth in the same year as a first union (0.09) and a low proportion of women who had a first birth prior to entering a first union (0.16). Among those ever married or in unions, a large majority did not have a child before entering their first union (0.66), however neither the proportion reporting that they had a child in the same year as their first union (0.22) nor the proportion reporting that they had a child before their first union (0.12) was negligible.[viii]

Women who reached menarche at age 17 or later were more likely to have a child before entering a first union than those who reached menarche from ages 14 to 16 or at age 13 or earlier (0.23 compared with 0.17 and 0.17, respectively). A greater proportion of young women who contracepted prior to a first birth did not have a first birth before entering a first union (0.85 compared with. 0.65, respectively). Women who did not contracept prior to a first birth were more likely to have a first birth in the same year that they entered a first union than women who contracepted (0.17 compared with 0.02, respectively).

Women who were HIV positive at survey were significantly more likely to have a child before entering a first union than women who were HIV negative at survey (0.29 compared with 0.16, respectively). A greater proportion of young women who were HIV negative at survey did not have a first birth before entering a first union than those who were HIV positive at survey (0.67 compared with. 0.52, respectively).

Age at first union, age at first sex, and age at first birth by socio-demographic characteristics

Age at first union, age at first sex, and age at first birth were calculated using the actuarial life table method. Figure 1 shows a significant shift to a later age at first union among women born in the 1965 to 1974 cohort and those in the cohort born after 1975. Figure 2 shows that there was a significant increase in age at first sex from the cohort born before 1965 to the cohort born in the period 1965 to 1974, while there was no difference between the cohort born 1965 to 1974 and the cohort born after 1975.

(Figures 1 & 2 about here)

While the median age at first union increased from 19.3 for the cohort born before 1965, to 20.8 for the cohort born from 1965 to 1974, to 21.5 for the cohort born after 1975, the median age at first sex increased from 17.7 for the cohort born before 1965 to 18.4 for both the 1965 to 1974 cohort and the cohort born after 1975. Given the difference in the magnitude of the increases by cohort in the age at first union (later cohorts had a median age that was 2.2 years older than earlier cohorts) and the age at first sex (an increase of 0.7 years), we would expect that unless contraception or abortion rates were to increase, an increasing proportion of women would experience premarital first births.

Figure 3 shows a comparison of the distribution of age at first birth and age at first union by birth cohort for women in Moshi. Figure 3, show that the gap between age at first union and age at first birth from the cohort born before 1965 cohort to the cohort born 1965 to 1974 and the cohort born after 1975 narrowed. For instance, the age at which the shift from larger proportions remaining childless to larger proportions remaining not in a union decreased, from approximately age 25 years for the cohort born before 1965 to an age in the early 20's for women born in the 1965 to 1974 cohort and the cohort born after 1975.

(Figure 3 about here)

Figure 4 shows the age at entry into first union by duration of single motherhood. Entrance into a first union differed significantly by duration of motherhood status. Women who had a first birth in the same year as their first union entered into a first union at slightly younger ages than those who had no premarital birth. Women who were single mothers for one to two years had age trajectories into first unions as those who had no premarital birth. Women who were single mothers for three to four years had later ages at first union than those who have no premarital birth for ages below 25 years, however after age 25 the reverse pattern held. Figure 4 demonstrates that women who had been single mothers for five or more years were significantly less likely to enter a first union. However, this pattern of motherhood and entry into first union may be confounded by the effects of education, religion, tribe, cohort, and age at menarche.

(Figure 4 about here)

Age at first union and age at first birth vary significantly by the respondent's birth cohort, age at survey, level of education, religion, tribe, age at menarche, and use of contraception. Table 2 presents the median age at first union and median age at first birth and 95 percent confidence intervals, stratified by socio-demographic characteristic**.** Based on the analysis above, birth cohort was merged to before 1965 or the cohort born after 1965. The median age at first union was 20.8 years old (95% CI=20.5-21.1). Younger women had a significantly later age at first union than did older women: those aged 20 to 24 had a median age at first union of 21.5 (95% CI=21.0-22.0) while those aged 40 to 44 had a median age at first union of 19.3 (95% CI=19.1-19.5). Median age at first union increased significantly with level of education: women with no education or primary education had a median age at first union of 18.1 years (95% CI=17.9-18.3) compared to

women with higher than secondary education who had a median age at first union of 24.0 years (95% CI=23.7-24.3). Christians had a later age at first union than did Muslims—the median age at first union for Muslims was 19.1 years (95% CI=18.9-19.3) and the median age at first union for Christians was 21.9 years (95% CI=21.5-22.3). The median age at first union for women who did not contracept was 20.5 years (95% CI=20.2-20.8), while less than half of women who reported using contraception before their first birth had entered a first union.

(Table 2 about here)

The median age at first birth was 21.3 years of age (95% CI=21.0-21.9). Ever married and in union women had a median age at first birth of 20.3 years (95% CI=20.1-20.5) compared to 28.3 years (95% CI=27.6-29.0) for women never in union. Women with higher levels of education had a significantly later median age at first birth, as did women who reached menarche at later ages. Muslim women had a significantly earlier age at first birth than Christian women (19.8 years, 95% CI=19.6-20.0 compared with 21.9 years 95% CI=21.6-22.2, respectively). Chagga women had a significantly later median age at first marriage (22.0, 95% CI=21.7-22.3) than women from other tribes (20.3, 95% CI=20.1-20.5 for Pare, 20.3, 95% CI=20.0-20.6 for other). Finally, women who used contraception prior to their first birth had a significantly later median age at first birth than those who did not contracept prior to their first birth (30.2 years, 95% CI=30.0-30.4 compared with 21.0 years, 95% CI=20.7-21.3, respectively).

Influence of motherhood status and duration of single motherhood on first union in Moshi, Tanzania

Table 3 shows discrete time logistic regressions for the influence of motherhood status and duration of single motherhood on entry into a first union. Consistent with the life

table analysis, model 1 shows that the odds of marrying increased from ages 12 to 14 to ages 19 to 20 and decreased after age 20. Contrary to the notion that a first birth is stigmatising and decreases the marriagebility of young women, women with a first birth were 3.20 times as likely to enter a first union as women without a first birth. However, women who had first births prior to entering their first union differed from other women on a variety of characteristics, as shown in Table 1. To assess the effect of a first birth prior to entering a first union on first union formation, model 2 included controls for birth cohort, education, religion, tribe, and menarche.

(Table 3 about here)

The age pattern of entry into a first union was similar in model 1 and model 2, but the effect of motherhood status was attenuated and women with a child were only 2.38 times as likely to enter a union compared to childless women. In addition, model 2 shows that women born before 1965 were 1.41 times as likely to enter a first union as women born in 1965 or later. Women with secondary education were 0.59 times as likely to enter a first union as women with primary education. Women with higher than secondary education were 0.36 times as likely to enter a first union as women with primary education. Muslim women were 1.42 times as likely to enter a first union as Christian women. There was no significant difference in the odds of marrying between Pare and Chagga, while women reporting an other tribe (being neither Pare nor Chagga) were 1.37 times as likely to enter a first union as Chagga women. Finally, women who had reached menarche were 14.32 times as likely to enter a first union as women who had not yet reached menarche.[ix]

In model 2, the estimate for the effect of a first birth on first union formation may conceal differences based on the duration of single motherhood. That is, a first birth may

accelerate the union formation process if a first birth were a step in the union formation or if entering a first union reduced the stigma of a premarital pregnancy. However, if a first union did not occur relatively quickly after a first birth, then the woman may have not entered a union with the biological father of the child and being a mother may decrease the likelihood of a entering a first union. In other words, the effect of a first birth on the odds of a first union may depend on the duration of time that elapsed since the first birth. Model 3 shows the effect of time spent as a single mother on entrance into a first union controlling for the effects of birth cohort, education, religion, tribe, and menarche.

Duration of single motherhood had a relationship with entry into first union. Women who spent less than a year in single motherhood were 7.34 times more likely to enter into a first union than childless women. Women who were single mothers for five or more years were 0.41 times as likely to enter into a first union as women without children. Women were single mothers for one to two or three to four years were not significantly more or less likely to enter a union than women without children. The odds of entering a first union for women aged 25 to 29 increased from 0.69 in model 2 to 1.27 in model 3 suggesting that women aged 25 or older were likely to enter a first union, especially if they had not had a first birth. The magnitude and direction of the odds of entering a first union for each of the other covariates were very similar in model 3 and model 2.

Conclusion

Moshi, Tanzania experienced a similar pattern between union formation and first birth as was seen across much of sub-Saharan Africa (Bledsoe and Cohen 1993; Meekers 1994a; ORC Macro 2005). Age at first union increased more rapidly across birth cohorts born before 1965 and 1965 or later than age at first sex with the median age at first union

increasing from 19.3 to 21.2 and the median age at first birth increasing from 20.4 to 21.4. Consistent with Calvès' findings in Cameroon, there was evidence suggesting that women with premarital births in Moshi are subject to marginalization in the marriage market if they remain single more than five years after the birth of their first child. The majority of women who had a premarital birth a year or more before they entered a union (62.5%) remained single more than five years after the birth of their first child. In contrast, a first birth accelerated entrance into a first union for women who have spent less than a year as single mothers.

In Moshi, age at first sex increased, but it did not increase as rapidly as age at first union. While only 5 percent of women in Moshi contracepted prior to a first union, those who contracepted had much later first births and were half as likely to have a first birth that was either in the same calendar year that they entered a union or more than a year before they entered a union, compared with women who did not contracept. The effectiveness of contraception in avoiding a first birth may be underestimated since this analysis neither took into account induced abortion nor the consistency of contraception. This analysis only had information about ever use of contraception before a first union.

The results obtained are consistent with the argument that traditional restrictions on women that lead to earlier ages at first union have lessened, while the costs of avoiding a birth prior to entering a first union remain high. These findings are consistent with Meekers' (1994) argument that changes in the pattern of first births and union formation are likely to be due to changes in the social context of sexual behaviour more than intentional childbearing motivated by economic or marital ends. It is possible that births before a first union are a result of unintended consequences of sexual relations, which, were it not for the increasing age at first union, would be births within unions. The

increased likelihood of union formation after a pre-union first birth probably reflect the desire to reduce the stigma of a non-marital birth. However, women in Moshi who did not enter unions within a five years of the first birth were disadvantaged in the marriage market.

Moshi is an urban area, with a relatively high level of education and low fertility. As such, Moshi may provide insight to future changes in Tanzania, and similar societies in East Africa. However, more research is needed to explore the extent to which these changes in the pattern of union formation and first birth have occurred throughout the region, as well as to explore the social effect of the pace of these changes. Further, as fertility decreases throughout the region, the ramifications of a premarital first birth may change.

Later age at first union in Moshi is patterned along common social lines. Throughout the region, increased age at first union is more common among women with higher levels of education, and this pattern holds true in Moshi. Historically, there is wide variation across Africa in the occurrence of nonmarital births among never married women (Gage-Brandon and Meekers 1993). We find that a substantial proportion of women had a first birth prior to entering a first union (0.18) and that if we include those who had a child in the same year as their first union (0.16) the proportion of women who likely conceived their first child outside of a union includes about a third of all women. There may be concern that larger proportions of women with first births from more recent cohorts are entering unions a year or more after their first birth compared with past cohorts (0.18 compared with 0.15). This is of particular concern given that most women who had a birth a year or more before entering a union remained single more than five years after their first birth.

Finally, there is evidence that concern for women who have births outside of unions is warranted. For instance, women with births prior to entering a union have higher rates of HIV at survey date ($p<0.001$). Specifically, 11.1 percent of women who entered a first union the same year as their first birth and 8.4 percent who did not have a birth before entering into a union were HIV positive, while as many as 17.5 percent of women who had a first birth a year or more prior to entering a first union were HIV positive. The difference in HIV rates, coupled with the low rates of contraception among nulliparous women suggest that the promotion of contraception, especially condoms which protect against pregnancy and HIV infection, would help women remain healthy and not endure the costs of a first birth outside of a union.

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Table 1: Weighted proportion distribution of socio-demographic characteristics and HIV infection at survey by motherhood status at first union in Moshi, Tanzania[1]

	Did not have a child before first union	Had a child same year as first union	Had a child before first union	p value[2]	Sample size
Total	0.65	0.16	0.18		1891
Birth Cohort					
Before 1965	0.62	0.23	0.15	0.001	323
1965 or later	0.67	0.15	0.18		1568
Age at survey date					
20-24	0.75	0.09	0.16	0.001	590
25-29	0.65	0.15	0.20		467
30-34	0.56	0.24	0.20		354
35-39	0.65	0.17	0.18		262
40-44	0.60	0.26	0.15		218
Ever married/ in union					
Yes	0.66	0.22	0.12	0.001	1387
No	0.65	0.00	0.35		504
Education					
Primary	0.68	0.18	0.14	0.493	161
Secondary	0.65	0.17	0.19		1225
Higher	0.69	0.15	0.17		505
Religion					
Muslim	0.66	0.17	0.18	0.983	583
Christian	0.66	0.16	0.18		1308
Tribe					
Chagga	0.67	0.15	0.18	0.285	978
Pare	0.62	0.17	0.21		234
Other	0.66	0.18	0.16		679
Age at menarche					
<= 13	0.62	0.21	0.17	0.008	241
14-16	0.68	0.15	0.17		1336
>=17	0.59	0.18	0.23		314
Use of contraception prior to first birth					
No	0.65	0.17	0.18	0.004	1799
Yes	0.85	0.02	0.13		92
HIV status at survey					
Negative	0.67	0.17	0.16	0.001	1192
Positive	0.52	0.19	0.29		144
Total sample size	1263	295	333		1891

1. Only women who had entered a union could have their first birth in the same year as their first union.
2. Based on the Pearson χ^2 test.

Table 2: The median age and 95 percent confidence interval (CI) at first union and at first birth by socio-demographic characteristics in Moshi, Tanzania

	Median age at first union	95% CI	Median age at first birth	95% CI	Sample size
Total	20.8	20.5 - 21.1	21.3	21.0 - 21.6	1891
Birth Cohort					
Before 1965	19.3	19.1 - 19.5	20.4	20.1 - 20.7	323
1965 or later	21.2	20.8 - 21.6	21.4	21.1 - 21.7	1568
Age at survey date					
20-24	21.5	21.0 - 22.0	21.3	21.0 - 21.6	590
25-29	21.3	20.9 - 21.7	21.7	21.4 - 22.0	467
30-34	21.0	20.6 - 21.4	21.2	21.0 - 21.4	354
35-39	19.7	19.4 - 20.0	21.4	21.1 - 21.7	262
40-44	19.3	19.1 - 19.5	20.0	19.8 - 20.2	218
Ever married/ in union					
Yes	-		20.3	20.1 - 20.5	1387
No	-		28.3	27.6 - 29.0	504
Education					
Primary	18.1	17.9 - 18.3	18.8	18.6 - 19.0	161
Secondary	19.8	19.5 - 20.1	20.4	20.2 - 20.6	1225
Higher	24.0	23.7 - 24.3	24.1	23.8 - 24.4	505
Religion					
Muslim	19.1	18.9 - 19.3	19.8	19.6 - 20.0	583
Christian	21.9	21.5 - 22.3	21.9	21.6 - 22.2	1308
Tribe					
Chagga	22.1	21.7 - 22.5	22.0	21.7 - 22.3	978
Pare	19.7	19.4 - 20.0	20.3	20.1 - 20.5	234
Other	19.6	19.4 - 19.8	20.3	20.0 - 20.6	679
Age at menarche					
<= 13	19.3	18.9 - 19.7	19.7	19.4 - 20.0	241
14-16	20.8	20.5 - 21.1	21.2	20.9 - 21.5	1336
>=17	21.6	21.3 - 21.9	22.0	21.8 - 22.2	314
Use of contraception prior to first birth					
No	20.5	20.2 - 20.8	21.0	20.7 - 21.3	1799
Yes	-	-	30.2	30.0 - 30.4	92

Table 3: Discrete time logistic regression models, odds ratios (OR) and 95% confidence intervals (CI) of the influence of motherhood status and duration of single motherhood on entry into first union in Moshi, Tanzania

	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 3 OR (95% CI)
Motherhood status			
Does not have a child	1.00	1.00	
Has a child	3.20 (2.63-3.89)	2.38 (1.92-2.94)	
Duration of single motherhood			
No time as single mother			1.00
Less than 1 year			7.43 (5.96-9.27)
1-2 years			1.28 (0.99-1.66)
3-4 years			0.77 (0.53-1.12)
5+ years			0.41 (0.28-0.60)
Control variables			
Cohort			
1965 or later		1.00	1.00
Before 1965		1.41 (1.18-1.69)	1.35 (1.13-1.61)
Age of observation			
Age <=14	0.04 (0.03-0.06)	0.13 (0.08-0.21)	0.13 (0.08-0.20)
Age 15-16	0.29 (0.23-0.36)	0.31 (0.25-0.39)	0.31 (0.25-0.38)
Age 17-18	0.65 (0.54-0.77)	0.60 (0.50-0.72)	0.57 (0.47-0.69)
Age 19-20	1.00	1.00	1.00
Age 21-22	0.64 (0.52-0.79)	0.70 (0.56-0.86)	0.81 (0.65-1.00)
Age 23-24	0.62 (0.48-0.79)	0.69 (0.53-0.91)	0.93 (0.71-1.22)
Age 25 +	0.59 (0.47-0.75)	0.69 (0.55-0.88)	1.27 (1.01-1.58)
Education			
Primary		1.00	1.00
Secondary		0.59 (0.44-0.80)	0.53 (0.41-0.70)
Higher		0.36 (0.26-0.49)	0.29 (0.22-0.38)
Religion			
Christian		1.00	1.00
Muslim		1.42 (1.21-1.66)	1.46 (1.26-1.70)
Tribe			
Chagga		1.00	1.00
Pare		1.10 (0.81-1.48)	1.15 (0.87-1.53)
Other		1.37 (1.18-1.58)	1.34 (1.16-1.55)
Menarche			
Not reached menarche		1.00	1.00
Reached menarche		14.32 (7.53-27.24)	13.60 (7.18-25.76)
Menarche imputed		0.24 (0.17-0.35)	0.23 (0.16-0.33)
Person Years	19565	19565	19565

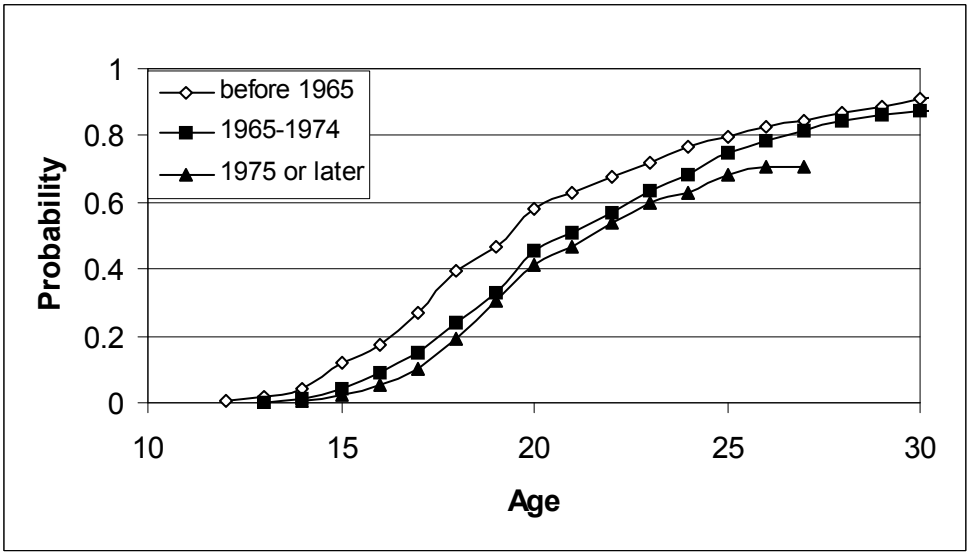

Figure 1: The probability of first union at each age by birth cohort

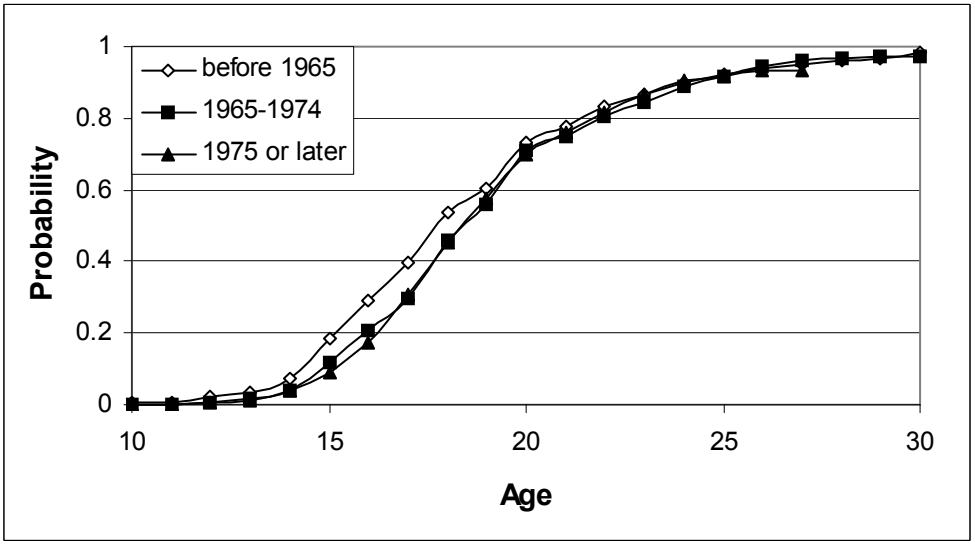

Figure 2: The probability of first sex at each age by birth cohort

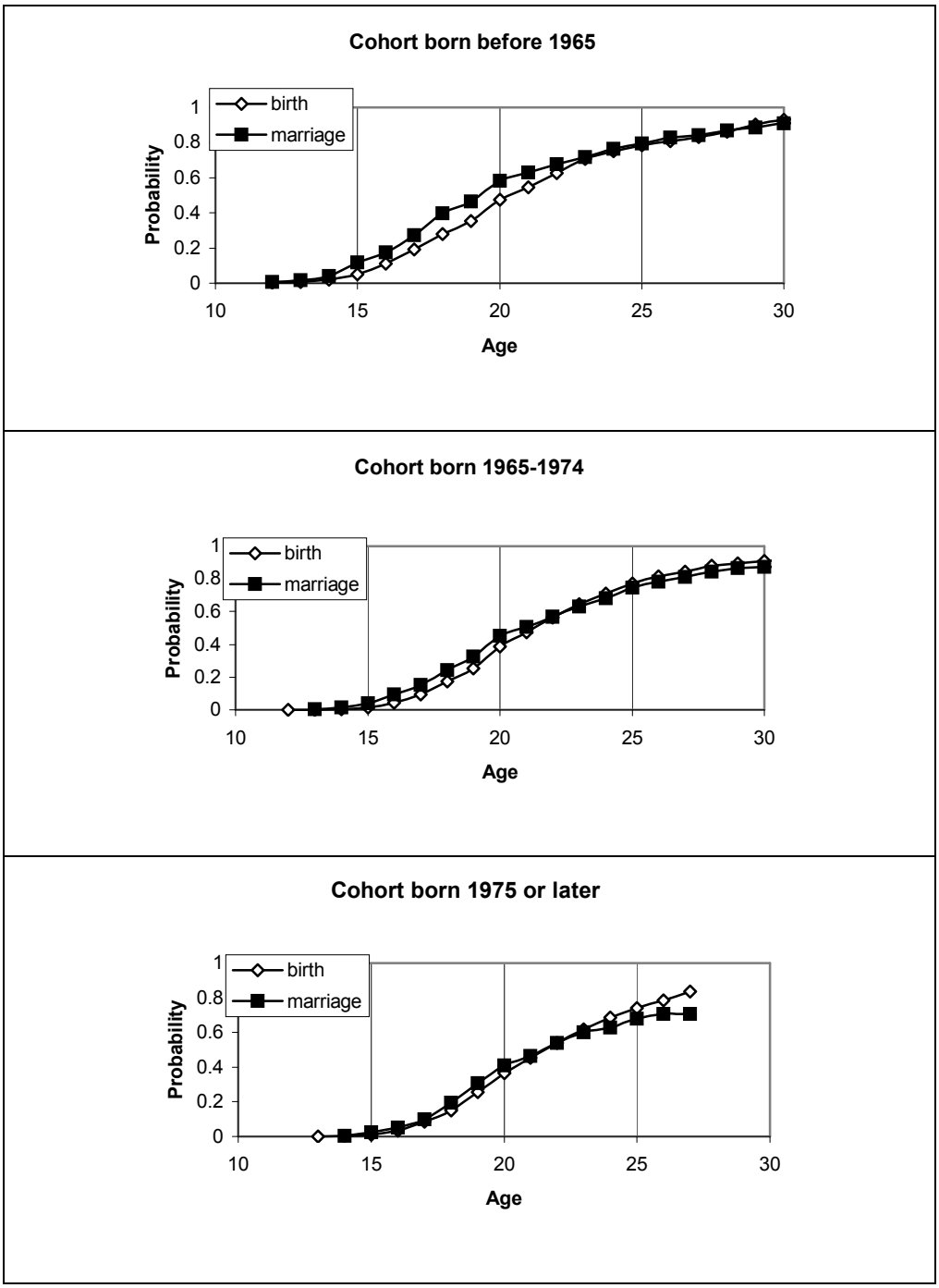

Figure 3: Comparison of probability of first union and probability of first birth at each age for the birth cohort born before 1965, for the birth cohort born 1965- 1974, and for the birth cohort born after 1975

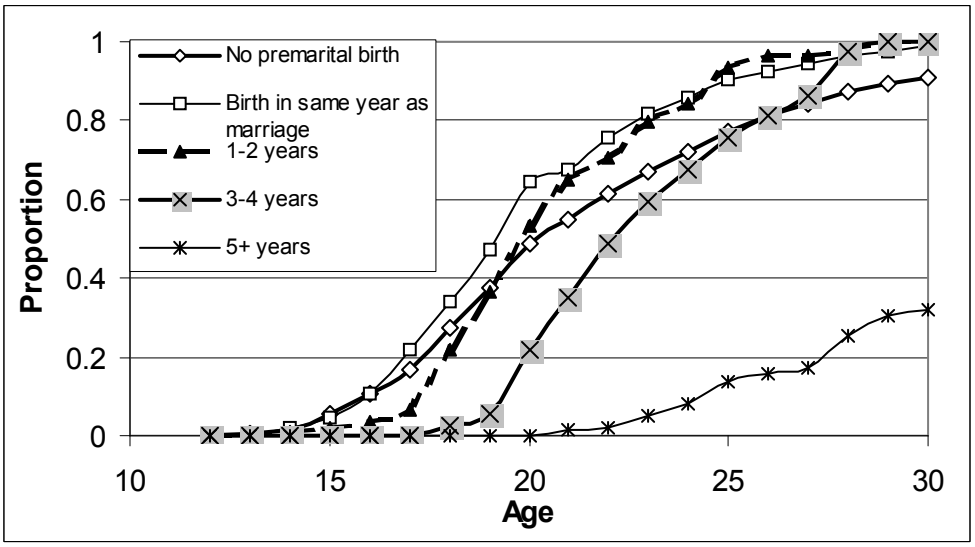

Figure 4: The probability of first union at each age by time spent as a single mother

[i] Complicating this is that educational attainment has decreased among those 15 to 19 years old: 15.2% of those aged 15-19 had no school in 1992, 20.8% had no school in 1999. Among those aged 20-24, 16.2% had no school in 1992 and 17.3% had no school in 1999. However, among those over 25 years of age in the 1990 DHS, larger percents of older cohorts had no education: 16.1% of those 25 to 29, 20.0% of those 30 to 34, and 38.9% of those 35-39 (ORC Macro, 2005). Also, there was a slight decrease in median age at first marriage among rural women from 18.7 in 1992 to 18.2 in 1999.

[ii] Age was missing for 2 women, religious identification was missing for 1 woman, tribe was missing for 1 woman, motherhood status was missing for 2 women, age at first sex was missing for 62 women who had had their first sex, age at first union was missing for 29 women who had had their first union, and union status was unclear for 24 women who reported never being married, yet answered questions about their age at first union.

[iii] HIV is the only STI included in this analysis.

[iv] We limit exposure to person-years up to age 30.

[v] There were inconsistent responses for 91 women on age at first birth and age at first sex. For these women age at first birth was recoded to age at first sex.

[vi] However, for a birth conceived after the union began to occur in the same calendar year as the union, the union would have to begin in the first three months of the year and conception would have to occur between the first and third months of the union. Given the necessary timing it is unlikely many couples would have a conception that was after their union began, and yet had the birth in the same year as their union began. We are relatively confident that few of the 295 women who reported that their first birth was the same calendar year as their first union had a birth that was conceived after the union

began. In fact, 168 of these births occurred before September 1st of the year the woman entered her union, 19 of these births were in September, 104 occurred October through December of the year. The month of birth was missing for 4 of these births.

[vii] Questions about menarche were only asked of women who were sexually experienced. Age at menarche was imputed to the median age at menarche, 15 years, for women who reported not being sexually experienced.

[viii] Note, those who had never been in a union could not be coded as having had a child in the same calendar year as their first union.

[ix] The flag for menarche having been imputed is significant—women who did not report an age at menarche were 0.24 times as likely to marry as women who reported an age at menarche.