Difficulties Conceiving and Relationship Stability in sub-Saharan Africa: The Case of Ghana

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Abstract

Little is known about the relationship between self-identified difficulties conceiving, biomedical infertility, and union instability in sub-Saharan Africa. Previous research suggests that infertility increases the risk of psychological distress and marital conflict, encourages risky sexual behavior, and deprives infertile individuals and couples of an important source of economic and social capital. Qualitative research has suggested that there may be a link between infertility and divorce; less is known about the implications of infertility for unmarried couples. In this paper, discrete-time hazard models are applied to 8 waves of secondary panel data from Ghana collected by the Population Council of New York and the University of Cape Coast (pooled n=10,418) between 1998 and 2004. Results show a positive relationship between perceived difficulties conceiving and relationship instability for both married women and those in nonmarital sexual unions; this relationship, however, does not hold for biomedical infertility. Future research should examine this relationship using nationally representative data in a cross-national comparison to determine whether results hold across the subcontinent.

Keywords: Infertility; relationship stability; Ghana; sub-Saharan Africa; event history analysis

Introduction

Research in sub-Saharan Africa (SSA) has begun to examine the consequences of infertility. Notably, culturally-specific definitions of infertility may include not only childlessness, but also not having 'enough' children; consequences of secondary infertility (that is, subsequent to the birth of a child) can also be quite severe (Donkor & Sandall, 2007; Leonard, 2002). Infertility negatively impacts and is impacted by factors such as psychological distress, marital instability, and stigmatization (Boerma & Urassa, 2001; Donkor & Sandall, 2007; Dyer, 2007; Fledderjohann, 2012; Hollos, Larsen, Obono, & Whitehouse, 2009; Hollos & Whitehouse, 2014; Leonard, 2002; Okonofua, 1999; Sundby & Jacobus, 2001; Tabong & Adongo, 2013a). Yet much remains underexplored about the relationship between infertility and social outcomes (Rouchou, 2013), including implications for romantic partnerships. Extant research on the link between infertility and relationship stability in SSA has generally been qualitative and/or cross-sectional (e.g. Dyer, Abrahams, Hoffman, & van der Spuy, 2002; Feldman-Savelsberg, 2002; Hollos et al., 2009). These excellent studies provide key evidence that a link may exist, but quantitative longitudinal studies are a necessary next step. The few studies using quantitative data to examine this issue (for example, Boerma & Urassa, 2001) tend to focus on marriage, with less attention paid to the effects of infertility among those in non-marital sexual unions.

Much of the literature on infertility in SSA has focused on the so-called *infertility belt* of Central Africa, where rates of infertility are especially high. Yet high rates of infertility are not found exclusively in this region, providing an impetus to examine further the impact of infertility across the sub-continent. In this paper I explore the implications of infertility for relationship stability in SSA, taking Ghana as an example. Ghana is a particularly interesting case study for several reasons. First, infertility impacts about 17-18% of Ghanaians of reproductive age (Larsen, 2000), a substantial minority of the population. Second, Ghana is undergoing a fertility transition. The Total Fertility Rate (TFR) in Ghana fell by an astounding 2.8 children per woman on average between 1970 and 2014 (Population Reference Bureau, 2015), coinciding with a decline in reported fertility desires (Demographic & Health Surveys, 2015). Finally, Ghana fares comparatively well on socioeconomic and demographic indicators relevant to fertility, family formation, and the availability of reproductive

health technology (World Bank, 2015). For example, the number of women who have never attended school dropped from 40% in 1988 to 21.2% in 2008 (Demographic & Health Surveys, 2015). Over the same period, the number of adults who had attended secondary school rose from 7.5% to 58.6%. The poverty rate has also declined substantially— from 2005 to 2013, the poverty rate declined from 31.9% to 24.2% (Ghana Statistical Service, 2014). Availability of services for treating infertility is also increasing, and targeted programs have begun to lobby for the wider availability of infertility care (Osei, 2014).

Increasing education and economic opportunities, declining fertility desires, and the increasing availability of medical technology may have important implications for the stability of partnerships, social pressure to conceive, reproductive health knowledge, and psychosocial responses to (perceived) infertility. However, access to health technology is unevenly distributed (Yebei, 2000) and strongly shaped by partner preferences (Ngom, Debpuur, Akweongo, Adongo, & Binka, 2003). Moreover, women in Ghana still face considerable social pressure to have children (Donkor & Sandall, 2007; Fledderjohann, 2012; Tabong & Adongo, 2013a, 2013b). Infertility may still have a strong impact on relationship stability in spite of progress on social indicators.

This study uses event history analysis of self-reported (non-clinical) panel data to answer two main research questions: (a) Is there an association between infertility and relationship disruption, and (b) Does the risk of relationship disruption differ for those who are married compared to those in non-marital sexual unions? I draw on secondary data from Ghana to document the association between infertility and relationship stability. Although SSA as not a homogeneous unit, the single-country case study presented here importantly contributes to the fertility and family literature in this region in three ways. First, I examine infertility not only in marital unions, but also in non-marital sexual unions. Second, I document the consequences of infertility outside of the so-called *infertility belt*. Third, I apply quantitative analysis to longitudinal data to provide empirical evidence on the association between infertility and relationship disruption.

Relationship Formation and Disruption in sub-Saharan Africa

Marriage is a central, nearly universal institution in SSA, providing couples with adult status, economic resources, and ancestral linkages (Aryee, 1997; Farnes, Beckstrand, & Callister, 2011; Hollos & Whitehouse, 2014; Oppong & Abu, 1987; Tabong & Adongo, 2013a). Women are often expected to begin childbearing immediately after marriage, and motherhood earns one higher social status (Oppong & Abu, 1987; Wilkinson & Callister, 2010). Among the patrilineal Ijo of Nigeria, for example, childbearing is vital for obtaining social status and respect. Where bridewealth is still commonplace, payments may be seen as an investment in a fertile woman who will continue the family lineage; if the couple does not produce children, repayment may be demanded (Aryee, 1997), placing considerable pressure on the bride. Although the manifest function of the bridewealth is to tie two families together, one latent function is to facilitate divorce when a woman does not fulfil her reproductive responsibilities (Armstrong, 1997).

Obtaining accurate estimates of divorce is difficult due to data limitations, but it appears that divorce is quite common in SSA (Takyi & Broughton, 2006; Takyi & Gyimah, 2007). Estimates range between 25% and 60% depending on the demographic group under consideration. Nearly 70% of marriages are officially monogamous, but men sometimes have sexual partners whom they do not marry (so-called *outside wives*; Takyi & Broughton, 2006; Takyi & Gyimah, 2007; Zabin & Kiragu, 1998). These relationships may mirror polygynous marriage, and may even include non-marital fertility, but they are not legal unions. Therefore, they are not figured into divorce statistics in the event of relationship disruption (Salm & Falola, 2002). The correlates of instability in non-marital relationships in SSA are even less clear; nor are the implications of various premarital partnership patterns for relationship stability apparent. The few extant studies of non-marital unions in SSA have suggested that there are several key forms: those that progress towards marriage, those that are entered into when a (male) partner is already involved in one or more existing unions, and those that are disrupted and do not result in a marriage (Aryee, 1997; Barden-O'Fallon, 2005; Bledsoe, 2002; Desgrees du Lou, 1999; Meekers, 1992; Meekers & Calvès, 1997; Salm & Falola, 2002).

For unions that progress to marriage, there is no universal path to tread. Paths vary by length, family involvement, type and number of ceremonies, cohabitation patterns, and a variety of other factors (Meekers, 1992). Relationships that do not transition to marriage may include partnerships entered into for economic gain (Aryee, 1997; Meekers & Calvès, 1997) and those that arise from migration, such as when a husband migrates for labour and forms a non-marital union (Desgrees du Lou, 1999). Also included are partnerships to test fertility with a partner outside of the marriage (Barden-O'Fallon, 2005; Bledsoe, 2002) and those that begin with the possibility of marriage, but terminate due to incompatibility (Salm & Falola, 2002).

Family and Fertility in Ghana

Both desired and achieved family size have been shrinking in Ghana over the past several decades (Demographic & Health Surveys, 2015). Between 1988 and 2008, reported ideal family size declined from 5.3 to 4.3 children per woman; over this same period, the TFR dropped from 6.4 to 4.0 children per woman (Demographic & Health Surveys, 2015). While most childbearing still occurs in the context of marriage, non-marital fertility is growing in prevalence (Gyimah, 2003; Moreland & Logan, 2000; Takyi & Gyimah, 2007). At the same time, the number of never-married and cohabiting women has increased. The percent of never-married women aged 15-49 rose from 19.8% in 1988 to 32.4% in 2008, while the percent cohabiting rose from 5.5% to 13.1% over the same period (Demographic & Health Surveys, 2015). Consequently, studies which exclusively focus on marital relationship may miss a substantial minority of (in)fertility. In addition, the median age at first marriage and intercourse have risen between 1988 and 2008, respectively from 12.9 to 23.5 years and 16.5 to 18.4 years. As Meekers (1992) notes, age at first marriage is the strongest determinant of premarital childbearing.

In spite of the declines in fertility desires and family size in Ghana outlined above, childbearing remains the primary goal of marriage (Donkor, 2008). Childless women in particular experience a range of negative outcomes, and have even been denied funerary and burial rights, as funeral costs are often the responsibility of one's children (Donkor, 2008; Hollos et al., 2009).

Infertility can be devastating, especially for women, upon whom the blame for infertility disproportionately falls (Fledderjohann, 2012; Hollos et al., 2009; Tabong & Adongo, 2013b). Women who are not able to have (enough) children are labelled as 'useless,' and may be denied economic resources as a result of their failure to give birth (Hollos & Whitehouse, 2014). Previous studies of infertility among Ghanaian women have found an association with high rates of distress and depression (Alhassan, Ziblim, & Muntaka, 2014; Donkor & Sandall, 2007; Tabong & Adongo, 2013b). Takyi and Broughton (2006) found that ethnic identification may influence divorce. Within Ghana, membership in some groups may afford women more autonomy, which is associated with higher rates of divorce (Takyi & Gyimah, 2007). There is also evidence of a relationship between fertility behaviours and ethnicity (Addai & Trovato, 1999). Some sexual and birthing practices, which vary by ethnicity, are associated with an increased risk of reproductive tract infections and infertility.

Infertility and Relationship Stability in SSA

There are numerous measures of infertility used in the literature in SSA, which vary primarily in their focus (i.e. on conception vs. a live birth) and the length of the waiting time—that is, how long couples must try for a child before they are identified as infertile. For constructed measures (not based on clinical diagnosis), short waiting times may lead to an upward bias in estimates of prevalence (Larsen, 2005), but longer waiting times align poorly with women's own perceptions of their fecundity (Fledderjohann & Johnson, 2015). Previous work has shown that a 24-month infertility measure more closely matches women's own assessments than do other constructed measures (Fledderjohann & Johnson, 2015). It also offers a more conservative estimate of infertility than the traditional 12 month measure advocated by clinicians. A conservative measure is crucial in SSA, where long periods of lactational ammenorhea and labour migration are common. The 24-month measure offers an excellent compromise.

Across a wide range of measures, however, infertility has been shown to have a range of negative consequences in SSA. Importantly, while some of this literature focuses specifically on childlessness (for example, Donkor, 2008), the negative consequences of infertility are not exclusively

the purview of childless women. Previous research has suggested that the association between parity and infertility-related stress is not straightforward, finding no statistically significant difference in the effects primary versus secondary infertility on stress (Donkor & Sandall, 2007). Likewise, qualitative work among women with perceived infertility in Ghana has shown that both childless women and women with children suffer similar negative consequences of infertility, including relationship disruption (Fledderjohann, 2012).Childbearing is central not only to marriage, but also more broadly to adult life in SSA. Children provide invaluable assistance in subsistence activities, emotional fulfilment, continuation of the lineage, adult status, and economic security in old age (Caldwell, Orubuloye, & Caldwell, 1992; Dyer, 2007; Fledderjohann, 2012; Rouchou, 2013; Sundby & Jacobus, 2001). Across a large number of countries, couples experience substantial social pressure from family members to have large families, and to conceive quickly after marriage (Dyer, 2007; Dyer, Abrahams, Hoffman, & Van der Spuy, 2002; Oppong & Abu, 1987). Individuals who are (perceived to be) infertile—women in particular—face stigma, social isolation, and, in some cases, divorce and loss of custody of existing children (Dyer, 2007; Fledderjohann, 2012; Okonofua, 1999; Pearce, 1999; Sundby & Jacobus, 2001). Primarily qualitative research has shown that infertility negatively impacts relationship quality and increases risk of infidelity by both partners (Tabong & Adongo, 2013a). This may subsequently increase the likelihood of marital disruption (Boerma & Urassa, 2001; Leonard, 2002; Okonofua, 1999). In much of SSA, infertility is considered legitimate grounds for divorce (Barden-O'Fallon, 2005). Not all research, however, has shown that infertility is associated with divorce: Oppong and Abu (1987) suggest that polygyny may enable subfecund women to remain married, thereby reducing the risk of infertility-related marital disruption. The impact of infertility on the stability of non-marital unions is virtually unknown.

Some studies suggest that infertility is a leading cause of divorce in Ghana (Osei, 2014). It is estimated that 35% of first marriages in Ghana end in a divorce (Tabutin & Schoumaker, 2004). However, the annual divorce rate in Ghana has been on the decline, from 5.6% in 1988 to 3.2% in 2003 (Demographic & Health Surveys, 2015). Although bridewealth payments are also on the decline, the practice persists among some families in Ghana, with similar implications for repayment

as observed elsewhere (Armstrong, 1997; Aryee, 1997). As fertility is an expected outcome of marriage in Ghana, I hypothesize that there is a positive association between infertility and relationship disruption (Hypothesis 1). Furthermore, given that non-marital sexual unions do not provide the same social and legal protections as marriage provides, I hypothesize that non-marital unions will be more susceptible to relationship disruption (Hypothesis 2).

Materials and Methods

Data

I utilise eight waves of longitudinal data from three geographically varied regions of Ghana collected by the Population Council of New York and the University of Cape Coast between 1998 and 2004 (hereafter Cape Coast data, in reference to the university). A purposive sampling design was employed to maximise diversity of between-community economic modalities, local ecology, ethnicity, and kinship systems (Casterline, 2007). Six communities were selected: 4 inland and 2 coastal communities, including a mix of fishing, trading, and farming communities. The communities varied from one another on a variety of sociodemographic indicators, including education (percentage of women with more than primary education ranged from 27-58%), household wealth (mean number of household possessions ranged from 2.7 to 5.0 out of 11 items), religious affiliation (Orthodox Protestant 4-71%; Pentecostal 6-68%; Muslim 0-90%), and primary ethnic group (Fante, Denkyira, Ga, Adangbe, Ewe, Ahanta, and "other"). The locations were primarily rural, and located in the Western, Central, and Greater Accra regions. Within the 4 smaller communities, all households were enumerated, and all women of reproductive age in the household were selected. In the two larger communities, simple random sampling was used. Teams of one supervisor and four interviewers were sent to each community at each wave of data collection. Interviewers were selected from the communities in which they were working. Face-to-face interviews with women aged 15 to 50 years at the first interview were conducted in local languages (Fante, Twi, Ahanta, Ga, Adangbe, Hausa, or Ewe), and participants received a small gift for participation. Initially 1,219 women were interviewed. To account for attrition between Waves 1 and 2, 219 women were added at Wave 2. These women completed both the Wave 1 and Wave 2 surveys at that time, with the recall period for the Wave 1

survey corresponding to the date of first interview for the original sample (that is, October 1998-February 1999; see Casterline, 2007). At each wave, respondents were given both (a) the main survey, relating to demographic characteristics, fertility attitudes and behaviours, contraceptive behaviour, and other variables, and (b) a retrospective calendar instrument for the months between waves. Calendar data focused on fertility-relevant information, such as birth control use and marital status.

Analytic Sample

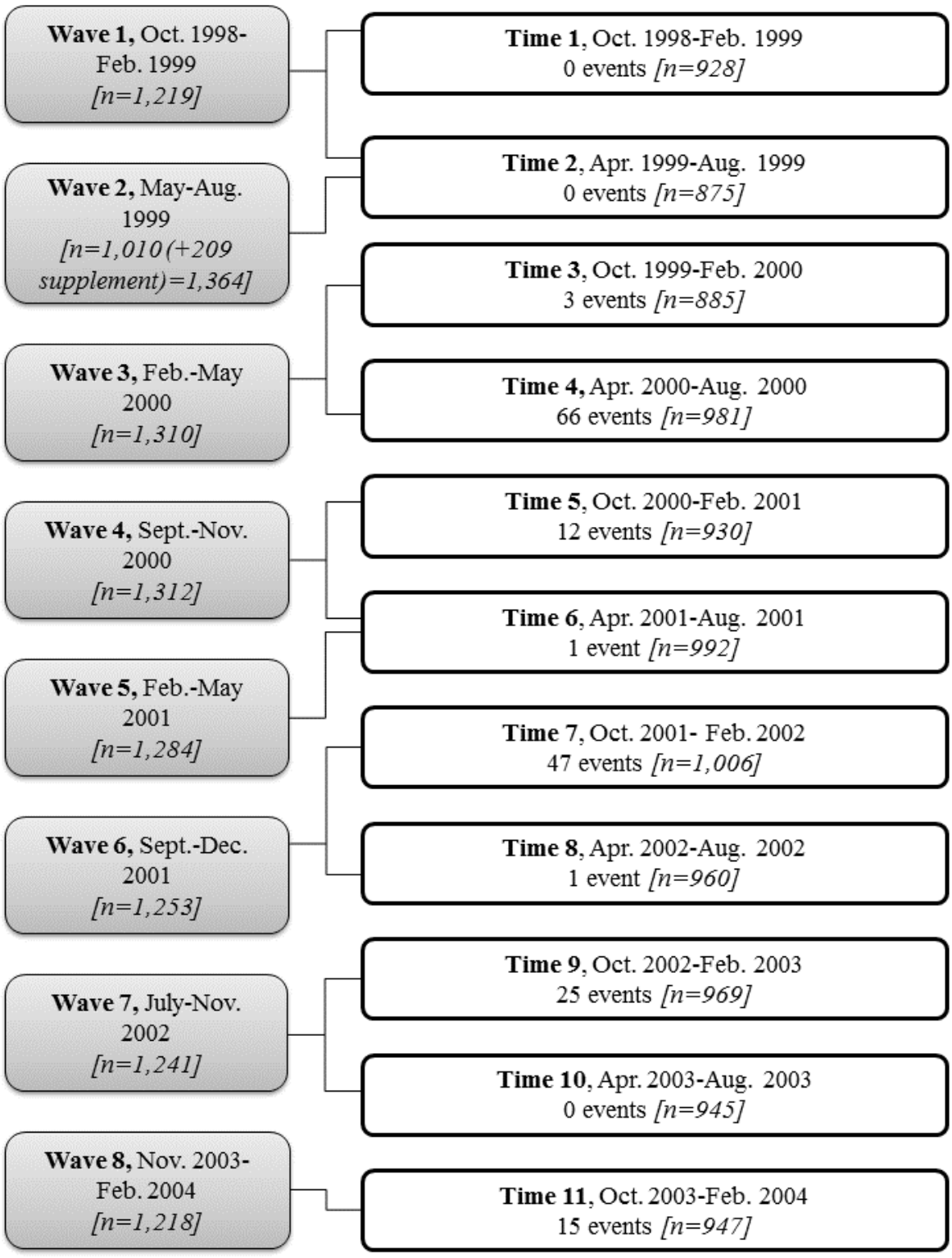
I defined several exclusion criteria to arrive at my analytic sample. First, the analyses were limited to female respondents. Second, women who were neither (a) married nor (b) involved in a sexual union were excluded from the risk pool, but were allowed to contribute to later waves if they entered a union while still under observation. For example, a woman who was single in waves 1-4 but entered a relationship prior to wave 5 would be included in the sample in wave 5, and would remain until experiencing a relationship disruption. Third, twelve cases were dropped due to attrition, and the sample was further restricted to women who were within the demographic age of fecundability (15-49). Finally, a small number of women were widowed, which substantively differs from other forms of relationship disruption. These women were allowed to contribute to the data set while in their relationship, but were censored at the point of widowhood. Missing data for background and demographic variables were around 3% in most cases. Missing data did not exceed 20% for any of variables in the analyses; the variable measuring fertility desires had the highest amount of missing data (19.27%). Missing data were multiply imputed using the ICE procedure in Stata 11. A total of 10 imputed data sets were created with this procedure. Results shown are averaged across these data sets using the *mim* procedure, which adjusts the standard errors to account for the uncertainty introduced by imputation (Marchenko & Royston, 2009).

While on average 10 months passed between interviews, this mean figure masks variation in the interview timing both between respondents and from wave to wave. Because there were uneven intervals between several of the interview dates, even time points were created based on a 6 month interval, resulting in a total of 11 time points (Allison, 1995; Teachman, 2011). Observations at each

time point were drawn from the most temporally proximate wave of survey data. Figure I provides a graphic overview of the Cape Coast sample across waves, represented in grey boxes, with the corresponding 11 time points created for the analysis represented in black and white boxes. The lines between the grey (wave) boxes and the black and white (time period) boxes indicate which waves correspond to the created time points. Sample sizes in the grey (wave) boxes on the left indicate the full sample size at each wave. Sample sizes in the black and white boxes on the right indicate the analytic sample at each constructed time point.

Time-varying variables were coded based on the most temporally proximate measurement of the variables. Pooled across 11 time points and accounting for censoring, the total number of observations was 10,418. There were substantially fewer observations (4,827) available for models using self-assessed difficulties conceiving as an independent variable because data on these measures are only available in Waves 6, 7, and 8. The number of observations increases between time points in some cases due to efforts to contact and interview respondents who had previously attrited, the addition of 209 cases in Wave 2, and women who were not in a union at time 1 entering a stable union subsequently. Number of events at each time point are included in Figure I to catalogue how the at-risk population is depleted via relationship disruptions across time points. Dates for contraceptive use and marital status, which are contained in the calendar data, are more precise than those for the main survey because the calendar data provide monthly retrospective reports for these items between waves. The correlation between 24-month infertility and non-contracepting perceived infertility is low (r=.12), highlighting the discrepancies between biomedical measures and perception. The correlation between contracepting perceived infertility and 24-month infertility is moderate (r=.48).

Figure I



Note: Original Cape Coast sample across 8 waves in grey boxes; analytic sample across 11 time points in black and white boxes.

The analytic subsample varies substantially from the full sample. The most notable difference is in marital status: 12% of the women in the full sample remained single (i.e. did not enter a stable

union) throughout the observation period and so were not included in the subsample here. This selection resulted in some slight differences in the sociodemographic characteristics compared to the full sample. Women in the subsample were slightly less well-educated than in the full sample (36% had no education, versus 40% in the full sample), and the ethnic makeup varied somewhat (14% were Adangbe, versus 16% in the full sample).

Analytic Strategy

I applied discrete-time hazard models to model the association between difficulties conceiving and relationship stability. Survival curves for the baseline hazard function and by infertility status for each of the measures of infertility were calculated using Stata's *ltable* function. The data were pooled across 8 waves and arranged in a person-period format, where each individual had as many listings in the data as measurement occasions (Allison, 1995; Singer & Willett, 2003). As with most longitudinal observational studies, some left-censoring occurred—in this case of respondents who were already in a non-marital relationship at time 1 (age at union was ascertained for marital but not non-marital relationships). Rather than excluding all left-censored cases (9.5% of the sample), these respondents were included in the data set at time 1.Union duration at first interview was included in the hazard models and increased at each successive month of observation (Guo, 1993).

Dependent Variable

The dependent variable was relationship disruption. At each interview, respondents were asked about current marital status: never married, in a stable union, currently married, separated, divorced, or widowed. Relationships which both began and terminated between survey rounds were not recorded; these relationships are short-term, and are unlikely to encompass the stable unions of interest here. There is no requirement of cohabitation here as an increasing number of sexual unions and conceptions occur outside of the context of cohabitation—particularly unions to test fertility. A dichotomous variable was created for each of the 11 time periods, with those who had experienced the event (divorce/separation) coded 1. Hereafter, the term relationship disruption will be used to refer to

any union dissolution. For married women, a separation would encompass any less formal stages leading up to a legal divorce, e.g. a partner moving out of the house; marital status, including separation, is self-reported in the survey. For unmarried women, this would simply involve the respondent reporting that she is no longer in the union between waves. The event variable was coded missing if either a) the respondent has not yet entered a relationship or b) the relationship has already ended at a prior time point. Multiple events were not considered; respondents were censored subsequent to a disruption even if additional relationships could be observed later in the data set.

Time-Varying Covariates

Infertility measures

Time-varying covariates were coded at each time point. Three measures of conception difficulties were used. First, an objectively identified measure drawn from the epidemiological literature (hereafter 24-month infertility) considers a woman infertile if she was not contracepting, was engaging in regular intercourse, desired to have a child, and had not experienced a birth within 24-months after a) the birth of a child or b) the beginning of a relationship (Larsen, 2005). It is possible for a respondent to move into/out of being susceptible to pregnancy, e.g. by beginning or ending contraceptive use. The final measures of difficulties conceiving are self-assessed *perceived* infertility, which may better-match local understandings of subfecundity (Barden-O'Fallon, 2005; Leonard, 2002). First, all women were asked "When you want to become pregnant, do you become pregnant quickly, or does it take a long time?" Second, women were asked "Would you like to have (a/another) child (with your husband/partner) or would you prefer not to have any (more) children (with him)." I classified women as reporting non-contracepting perceived infertility when they answered to the first question with "takes a long time," "impossible," or "don't know" or when they answered the second question with "cannot get pregnant." Additionally, all women were asked about their use of contraceptives. The corresponding set of questions asked " Are you and your husband/partner currently using (method) to space births or avoid pregnancy?" for each of the following methods: pill, injection, diaphragm/foam/jelly, condom, IUD, sterilization, rhythm/periodic abstinence, withdrawal,

herbs, Norplant, and "other." For the second perceived measure, hereafter contracepting perceived infertility, women who reported using any of these methods were coded as not reporting perceived infertility, even if they had indicated perceived infertility (e.g. takes a long time) in response to the fertility questions.

Other covariates

Given the strong, curvilinear relationship between age and infertility in the data, as well as the inverse relationship between age and divorce (Booth, Johnson, White, & Edwards, 1986), age in years was included to parse out the independent effects of age and infertility. A continuous indicator of relationship duration in months was included to account for potential effects of duration on relationship stability (Amato & Rogers, 1997; Booth et al., 1986), and to control for duration dependency (Box-Steffensmeier & Jones, 2004). Among married respondents, a dichotomous indicator was included for whether the respondent had any cowives.

For non-marital unions, a dichotomous measure indicated whether the union transitioned to marriage, because relationship quality may be higher among those who married. A dichotomous indicator of whether the relationship was a marital union captured qualitative differences that might exist between marital and non-marital unions. A categorical measure of parity was included. Based on preliminary analyses, curvilinear and interaction terms were included for age and relationship duration. Where curvilinear or interaction terms created extreme values, variables were divided by 1,000. This changes modified neither the strength nor the direction of the relationship.

Fixed Covariates

The only fixed covariate in the models, ethnicity, was drawn from Wave 1. Ethnicity was measured in seven categories in the Cape Coast data: Adangbe, Ga, Denkyira, Fanti, Ahanta, Ewe, and other. Due to small cell counts, several categories were collapsed, resulting in five final categories: Adangbe, Ga or Ewe, Denkyira, Fante, and Ahanta or Other.

Results

Descriptives

Table I

Descriptive Statistics for Cape Coast Data Across 11 Time Points (N=1,173; pooled N=10,418)

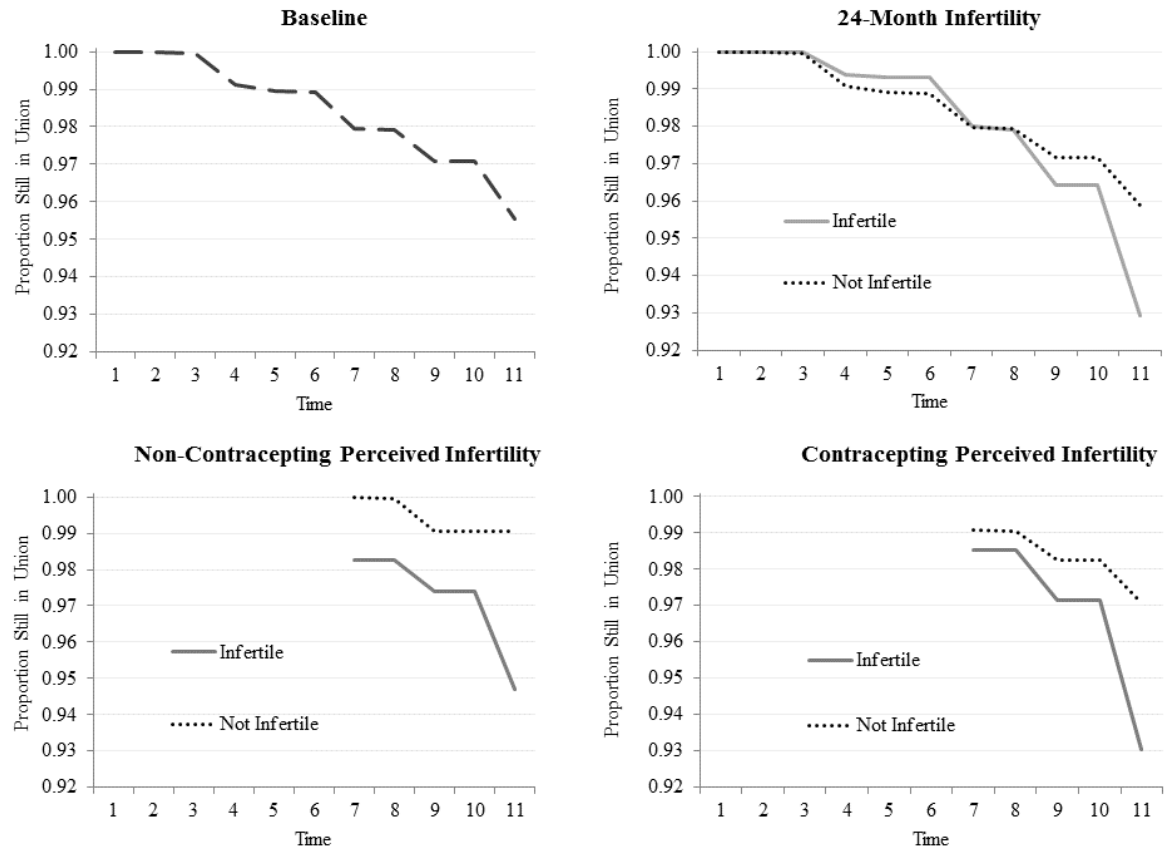
Variables	Mean	St. Dev.	Range
Relationship Disruption	0.02	0.13	0-1
24-Month Infertility	0.08	0.27	0-1
Non-Contracepting Perceived Infertility	0.56	0.50	0-1
Contracepting Perceived Infertility	0.11	0.31	0-1
Married	0.87	0.34	0-1
Union Transitioned to Marriage	0.17	0.38	0-1
Age in Years	29.61	8.60	15-50
Relationship Duration	47.47	19.55	1-66
Cowives	0.26	0.44	0-1
Parity	4.23	2.80	0-14
No Children	0.06	0.23	0-1
Only One Child	0.09	0.28	0-1
More Than One Child	0.85	0.39	0-1
Education Level			
No Education	0.40	0.49	0-1
Some Primary School	0.18	0.39	0-1
Finished Primary School	0.07	0.25	0-1
Attended Middle School	0.32	0.47	0-1
Attended Secondary School	0.03	0.17	0-1
Ethnicity			
Adangbe	0.14	0.35	0-1
Ga or Ewe	0.10	0.30	0-1
Denkyira	0.12	0.33	0-1
Fante	0.52	0.50	0-1
Ahanta or Other	0.11	0.31	0-1

Table I provides descriptive statistics for the analytic subsample (n=10,418; n=4,827 for perceived infertility). A minority of women (2%) experienced a relationship disruption during the observation period. A larger minority of nearly 10% did not conceive within 24-months after either a preceding birth or the start of a relationship. More than half of all women reported perceived infertility (not accounting for contraceptive use—that is, non-contracepting perceived infertility) and 11% reported perceived infertility while using contraception (that is, contracepting perceived infertility).

In Wave 1, the mean age of women is 29.6 years. Relationship duration varies between 1 and 66 months with a mean of 47 months. Most women (87%) are married, while a substantial minority (13%) are in a non-marital union. Among those in a non-marital union, 17% married during the observation period. Among married respondents, about a quarter (26%) have one or more cowives. The average number of children per women in my sample is 4.23. Merely 6% of respondents have no children, and an additional 9% have only one child. Nearly half (40%) never attended school. 35 percent reported having attended at least primary school, while only 7% of the sample reported obtaining a degree. 32 percent attended middle school, and a small minority (3%) attended or completed secondary school. A majority identify with the Fante ethnic group (52%), followed by Adangbe (14%), Ga or Ewe (10%), Denkyira (12%), or Ahanta or some other ethnic group (11%).

Hazard Models

Figure II



Note: Survival curves for perceived measures originate at time 7 due-missing data in previous survey waves. 24 Month Models= N=1,173; pooled N=10,418; Self-ID Models N=1,173; pooled N=4,827

A graphic display of the association between the hazard of relationship disruption and infertility status is provided in Figure II. The X axis represents the 11 data time points, while the Y provides the proportion of the sample still in a union. The baseline survival function is provided in the top left panel. In the baseline model (with no covariates accounted for), 100% of the sample are in a union at first point of observation, with a fairly steady decline across time to 95.6% remaining in a union in the final time period. The second panel, in the top right, provides the survival curve conditional on 24-month infertility status. Those identified as infertile are represented by a solid grey line, while those not infertile are shown with a black dashed line. Again there is a decline in those still in a union across time. However, this decline is much sharper for infertile women, particularly as relationship duration increases, to the extent that the survival curves cross over at time point 7. For women not identified as infertile by this measure, the proportion still in a union at the final observation is 95.9%, while the comparable figure for infertile women is 92.9%. This association, however, is non-significant. While the proportion still in a union is initially slightly higher for infertile couples than for those not experiencing infertility, this relationship reverses around time point 8. Thereafter, there is a sharp decline in the proportion of infertile women still in a union. The decline is much more gradual for those not identified as infertile. This may reflect a delay in the recognition of infertility by couples. Additionally, research in western settings has found that couples may bond during the process of treatment-seeking for infertility, in fact reporting an increase in cohesion and intimacy arising from the shared experience (Galhardo, Cunha, & Pinto-Gouveia, 2011). It is possible that couples in this study grew closer in the early stages of help-seeking, but later opted for relationship dissolution after their continued inability to conceive. Additionally, it may be that, while relationship duration is typically positively related to relationship stability (Amato & Rogers, 1997; Booth et al., 1986), for infertile couples a longer relationship duration may mean more time to test one's fertility and develop anxiety about the reproductive capacity of the relationship, thereby increasing the risk of disruption.

The bottom panels of Figure II provide the survival curves for fertile and infertile women based on the perceived infertility measures. Note that the curves do not start at 100%, and decline sharply at time point 7 because the measures were only collected in later waves. The figures reflect the fact that some relationships were terminated in previous waves. In the bottom left panel are the

curves for non-contracepting perceived infertility. This figure shows a large and growing gap in the hazard of relationship disruption, with nearly all (99.1%) women who do not perceive difficulties conceiving remaining in a union by the final time point, while only 94.7% of women who report non-contracepting perceived infertility remain in a union. The final panel, in the bottom right of Figure II, provides the curves for contracepting perceived infertility. There is a clear and growing gap between those who perceive infertility and those who do not, with 93.0% of the former and 97.1% of the latter remaining in a union up to the final time point. The variation in the patterns between the 24-month and perceived measures suggests a mismatch between biomedically defined infertility and the perception of difficulties conceiving. While the 24-month measure may more accurately capture underlying infertility, the perception of infertility appears to have a more clear-cut deleterious association with relationship stability.

Table II

Hazard of Relationship Disruption Accounting for 24-Month Infertility (N=1,173; pooled N=10,418)

	Model 1		Model 2		Model 3	
Variable	OR	95% CI	OR	95% CI	OR	95% CI
24-Month Infertility	1.55	0.86, 2.80	1.35	0.73, 2.49	1.24	0.41, 2.21
Married					0.74	0.50, 5.80
Union to Marriage					1.00	0.47, 1.09
Age			0.78***	0.70, 0.87	0.97	0.91, 1.17
Age Squared			1.42***	--	0.94	--
Relationship Duration					0.98	1.00, 1.08
Duration Squared					0.13***	--
Age*Relationship Duration					1.21**	1.02, 3.52
Cowives					1.94*	0.62, 1.44
Parity						
No Children					0.49*	0.36, 1.07
Only One Child					0.59*	0.37, 1.06
More than One Child (ref)					1.00	--
Ethnicity						
Adangbe					1.21	0.56, 2.93
Ga or Ewe					1.35	0.58, 3.43
Denkyira					1.76	0.87, 4.40
Fante					1.30	0.65, 3.02
Ahanta or Other (ref)						
Pseudo R-Squared				0.02		0.33

Source: Author's calculations using Cape Coast data; *p<.05 **p<.01 ***p<.001

Hypothesis 1 suggested a positive association between infertility and relationship disruption. The results presented in Table II (Model 1) show an increased odds of relationship disruption among women with a 24-month infertility. However this effect is not significant. Adding age and its squared term (Model 2) shows a u-shaped association between age and union disruption, but does not alter the non-significant effect of infertility. Adding all covariates (Model 3) improves the model fit (Pseudo R2=0.33) but does not affect the association between infertility and union disruption. Using a 24-month infertility measure, Hypothesis 1 is rejected. Women who have not conceived within 24 months after union formation or after having given birth to their previous child do not have a higher odds of experiencing union disruption. Hypothesis 2 suggested a stronger relationship between infertility and union disruption among women who were not married to their partner. The odds ratio of married (reference: unmarried) for union disruption suggests no association between 24-month infertility and union disruption. For this measure of infertility, Hypothesis 2 is rejected.

For the remaining covariates, relationship duration is strongly and statistically significantly associated with relationship disruption: for every one month increase in relationship duration, there is a drop in the odds of disruption. Older respondents in longer relationships face lower odds of disruption (OR=1.21) as indicated by the interaction term between age and union duration. Respondents in polygynous marriages exhibit greater odds of union disruption (OR=1.94) than those in monogamous unions. Childless women (OR=.49) and women with one child (OR=.59) have lower odds of union disruption than mothers of two or more children. Finally, ethnicity has no effect on union disruption.

Table III

Hazard of Relationship Disruption Accounting for Non-Contracepting Perceived Infertility (N=1,173; pooled N=4,827)

	Model 1		Model 2		Model 3		Model 4	
Variable	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Non-Contracepting Perceived Infertility	5.11***	2.77, 9.42	4.90***	2.65, 9.06	5.45***	2.78, 10.67	5.23***	2.65, 10.33
24-Month Infertility							1.54	0.68, 3.47
Married					0.30***	0.17, 0.54	0.31***	0.17, 0.55
Union to Marriage					1.32	0.70, 2.47	1.34	0.71, 2.54
Age			0.86*	0.73, 1.00	1.06	0.88, 1.28	1.04	0.86, 1.26
Age Squared			1.30*	1.01, 1.68	0.96	--	0.98	--
Relationship Duration					1.01	0.93, 1.10	1.00	0.92, 1.09
Duration Squared					0.30*	--	0.32*	--
Age*Relationship Duration					0.96	0.78, 1.17	0.97	0.79, 1.18
Cowives					4.08**	1.66, 10.03	4.15**	1.67, 10.29
Parity								
No Children					0.29*	0.10, 0.83	0.26*	0.09, 0.77
Only One Child					0.35*	0.15, 0.84	0.35*	0.15, 0.84
More than One Child (ref)					1.00	--	1.00	--
Ethnicity								
Adangbe					1.19	0.28, 5.10	1.14	0.27, 4.96
Ga or Ewe					2.25	0.51, 9.86	2.24	0.51, 9.91
Denkyira					3.01	0.73, 12.50	3.12	0.74, 13.27
Fante					2.00	0.52, 7.66	2.02	0.53, 7.79
Ahanta or Other (ref)					1.00	--	1.00	--
Pseudo R-Squared				0.05		0.34		0.34

Source: Author's calculations using Cape Coast data; *p<.05 **p<.01 ***p<.001

Table III provides the results of the hazard models predicting relationship disruption as a function of non-contracepting perceived infertility (not accounting for contraceptives), fertility variables, and sociodemographic variables. There is a strong, positive relationship between non-contracepting perceived infertility and disruption (OR=5.11, Model 1) that remains robust (OR=4.09) when non-contracepting perceived infertility age is controlled for (Model 2) as well as when other covariates are included (OR=5.45, Model 3). Hypothesis 1, which suggested a positive association between infertility and union disruption, can be confirmed for non-contracepting perceived infertility. Across all models, there is a statistically significant reduced odds of experiencing union disruption if married. Those in polygynous marriages have over 4 times the odds of disruption compared to those in monogamous unions. Hypothesis 2, which suggested a higher risk of union disruption among non-marital unions, is confirmed for non-contracepting perceived infertility. As a robustness check, Model 4 in Table III adds 24-month infertility to the full model. If the perception of difficulties conceiving is the salient factor, the effect of non-contracepting perceived infertility should remain largely unaffected by the inclusion of 24-month infertility. Conversely, if underlying sterility is more salient than the perception of subfecundity, the effect of perceived infertility should be substantially diminished. The correlation between these measures is low (r=.12), highlighting the discrepancies between biomedical measures and perception. Model 4 shows that the former assumption holds. Non-contracepting perceived infertility is strongly, significantly associated with disruption, even when controlling for underlying sterility. The *Pseudo R-Squared* does not change between Models 3 and 4.

Table IV

Hazard of Relationship Disruption Accounting for Contracepting Perceived Infertility (N=1,173; pooled N=4,827)

	Model 1		Model 2		Model 3		Model 4	
Variable	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Contracepting Perceived Infertility	2.02*	1.03, 3.94	2.22*	1.11, 4.49	1.63	0.80, 3.34	1.13	0.45, 2.85
24-Month Infertility							1.81	0.68, 4.87
Married					0.28***	0.16, 0.50	0.28***	0.16, 0.50
Union to Marriage					1.51	0.79, 2.90	1.53	0.80, 2.95
Age			0.84*	0.72, 0.98	1.03	0.86, 1.23	1.01	0.84, 1.22
Age Squared			1.39**	--	1.02	--	1.03	--
Relationship Duration					1.00	0.92, 1.08	0.99	0.92, 1.08
Duration Squared					0.32*	--	0.32*	--
Age*Relationship Duration					0.99	0.81, 1.21	1.00	0.82, 1.23
Cowives					3.76**	1.53, 9.24	3.74**	1.51, 9.25
Parity								
No Children					0.45	0.17, 1.24	0.41	0.14, 1.14
Only One Child					0.43*	0.18, 1.02	0.42*	0.18, 0.98
More than One Child (ref)					1.00	--	1.00	--
Ethnicity								
Adangbe					1.15	0.28, 4.79	1.12	0.27, 4.71
Ga or Ewe					2.09	0.48, 9.03	2.12	0.49, 9.22
Denkyira					2.86	0.70, 11.6	3.01	0.73, 12.31
Fante					2.11	0.56, 7.96	2.15	0.57, 8.07
Ahanta or Other (ref)					1.00	--	1.00	--
Pseudo R-Squared				0.02		0.31		0.31

Source: Author's calculations using Cape Coast data; *p<.05 **p<.01 ***p<.001

Table IV shows results for the association between relationship disruption and contracepting perceived infertility. The results presented in Model 1 show that women reporting contracepting perceived infertility are significantly more likely to experience a relationship disruption as compared to those who do not perceive infertility (OR=2.02). The effect of difficulties conceiving (OR=2.22) on union disruption increases when age is controlled for (Model 2) and is somewhat smaller and no longer statistically significant when other covariates are included (OR=1.63, Model 3). Controlling for all other covariates that may influence union disruption, Hypothesis 1 on the positive association between infertility and union disruption is rejected for contracepting perceived infertility. The previously reported finding on the relationship stabilizing effect of marriage is confirmed in this analysis. Based on this finding, Hypothesis 2 is confirmed. The other covariates mirror the findings presented in the previous tables. Finally, as a robustness check, in Model 4 24-month infertility is included. It is not statistically significantly associated with union disruption. Perceived infertility and age together explain 4% of the variance in disruption, and the full models explain about 34% of the variance.

Discussion

Drawing on longitudinal data from Ghana as a case study, this paper sought to answer two questions: (a) What is the association between difficulties conceiving and relationship disruption and (b) Does the risk of relationship disruption differ for married women compared to those who are in non-marital sexual unions? A 24-month measure of infertility and two perceived infertility measures were used. Although previous qualitative work in SSA has provided some evidence that infertility is associated with an increased risk of marital disruption (Fledderjohann, 2012; Gerrits, 2002; Hollos & Larsen, 2008; Rouchou, 2013), the quantitative analyses presented here provides mixed results. An "objective" measure of infertility, namely not having conceived within 24 months after the precedent birth or start of relationship, was not associated with union disruption. By contrast, the more "subjective" measures of *perceived* infertility were positively associated with relationship instability.

The findings from the present study point to substantive differences between the objective and subjective measures of infertility for couples, with important implications for relationship stability. Work on infertility measures in SSA has shown perceived infertility is most closely aligned with a 12-month constructed measure (Fledderjohann & Johnson, 2015). Due to the instability of the short waiting time to conception for a 12 month measure using survey data, however, the work advocates for the 24-month measure employed here.

The 24-month measure of infertility however, was a poor predictor of relationship disruption in this study. This suggests that the perception of infertility may be more salient for relationship stability than is underlying (in)ability to conceive, pointing to the need for future research on infertility to better-account for its perception (Leonard, 2002). Underlying sterility is unlikely to be distressing if one is unaware of underlying problems. Without their perception, difficulties conceiving cannot be cited as a justification for relationship disruption. These findings suggest that quantitative models of the social effects of infertility in SSA should exercise caution in relying exclusively on biomedical measures, as these measures may not fully capture the social aspects of infertility.

The findings of this study demonstrate the considerable value in using perceived infertility measures, but the treatment of contraceptive use is less clear-cut in constructing perceived as compared to biomedical and demographic measures. While non-contracepting perceived infertility was a strong, significant predictor of relationship disruption, this effect was no longer significant when accounting for contraceptive use. This raises an important question about the interplay between contraceptive use and perceived ability to conceive: How does contraceptive use affect perceptions about fertility. Conversely, how do perceptions about fertility shape contraceptive use? It may be, for example, that sporadic and consistent users of contraception differently perceive their ability to conceive. In this case, assuming that women who are using contraceptives do not perceive infertility introduces a conservative bias, as women who suspect infertility are (mistakenly) treated as successful contraceptors, and are not included in the infertility measure. Further research is needed to understand this complex relationship.

This study also identified substantial differences by relationship type in the hazard of experiencing a disruption: married women have significantly lower odds of experiencing a disruption than do women in a non-marital union. For unions which mirror marriages, emphasis will presumably be placed on childbearing—particularly if the union was entered into to "test" fertility. The risk of disruption may be greatest for these unions, as no legal ties bind the couple. For more casual unions, childbearing will likely not be expected, and difficulties conceiving are hence unlikely to impact relationship disruption. Future research should consider difficulties conceiving by relationship type, with distinctions between different types of non-marital partnerships. This study moreover shows that polygynous marriages face a higher risk of relationship disruption than monogamous marriages. In this case, polygyny does not appear to offer women protection from relationship disruption. Possibly, women in polygynous unions may not feel adequately supported by their husbands, who must meet the needs of multiple wives; these women may be more inclined to leave. Conversely, polygyny may stem from existing marital problems, and divorce following polygynous marriage may reflect the culmination of these existing problems.

Parity is also a significant predictor of disruption. Having one or no children actually reduces the odds of relationship disruption once difficulties conceiving and sociodemographic factors are considered. Low parity could signal either difficulties conceiving, or it could simply suggest that the couple is still early in their reproductive career. These two scenarios likely have quite different consequences. However, as parity is traditionally measured (and here), they would be indistinguishable. While further exploration of the role of parity is provided in Web Table I, data limitations prevent formation of more than a tenuous conclusion from the additional models. Specifically, only 6% of the sample did not have children, while 85% had two or more children; statistical power to disaggregate the findings by parity is therefore limited. Further investigation of these issues is needed.

There are several limitations to this study. First, the perceived infertility measures used here may not precisely match with women's self-assessments of fecundity. This imprecision is highlighted by the high contraceptive use among those who perceive infertility: While 56% report non-contracepting perceived infertility, 11% do so when the contracepting measure is used. Contraceptive

use may be a response to perceived infertility, used to give the reproductive system time to recuperate, thereby aiding in conception and ensuring healthy future pregnancies (Bledsoe, 2002). Current contraceptors could also perceive that their fecundity is reduced by their use of contraceptives, and report difficulties *because* they are using contraceptives. Contraception may also be used when relationship quality is low (Cox, Hindin, Otupiri, & Larsen-Reindorf, 2013), and for purposes other than preventing pregnancy (e.g. preventing sexually transmitted infections). Women using contraceptives sporadically may still suspect infertility; their exclusion would result in a conservative bias. The effect of controlling for contraceptive use for subjective measures is not clear-cut; perception of difficulties conceiving will potentially be detrimental to relationships regardless of contraceptive behaviour.

Additionally, the response "takes a long time" may arguably not in fact indicate perceived infertility. Greil (1991) found that U.S. women undergoing treatment identified as "not yet pregnant" rather than "infertile." While acknowledging difficulties conceiving, they were reluctant to embrace the label. However, where childbearing is expected very early, reporting "takes a long time" or "don't know" will likely capture perceived infertility whether or not the respondent accepts a formal label. Single women were excluded, so the measure here does not include women who express uncertainty because of abstinence.

Second, nearly one-fifth of the sample was missing on fertility desires. This may reflect high variability in fertility preferences within individuals across time (Sennott & Yeatman, 2012; Yeatman, Sennott, & Culpepper, 2013), with uncertainty prompting refusals. While fertility desires were not a key indicator of interest in this study, they may influence perceived infertility (Greil, McQuillan, Johnson, Slauson-Blevins, & Shreffler, 2010). Third, the data are not representative of the Ghanaian population. This may explain why only 2% of the sample experienced a relationship disruption, compared to the 3.2% divorce rate reported elsewhere (Demographic & Health Surveys, 2015). Importantly, while the odds ratios for the effect of perceived infertility measures used here are large, only 2% of the sample experienced a disruption, representing a small total number of events and, as a result, a small overall effect on separation. Fourth, I was unable to distinguish between primary and

secondary infertility. Given the substantial social value of even one live birth (Dyer, 2007; Hollos & Whitehouse, 2014), secondary infertility is likely to differ qualitatively from childlessness, and may have an attenuated effect on relationship stability. However, as discussed above, the negative consequences of secondary infertility can also be severe and should not be discounted. Fifth, lagged models were not included here due to the lack of previous evidence on the appropriate lag period. Sixth, the data do not contain adequate information about cowives, who appear to play an important role in shaping relationship disruption. Data on order and fertility of cowives would be particularly informative.

In addition, several issues arise from left-censoring: for relationships beginning prior to the first interview, it is impossible to tell whether existing children were born in the current or a previous relationship. The models may underestimate the effects of infertility for women who began the survey infertile or who did not become infertile across waves. Prior fertility may differ very little from childlessness for current relationship stability. Similarly, it is unknown how many women have had a marriage that ended prior to the survey. It may be that the first marriage is qualitatively different from subsequent marriages–especially if previous difficulties conceiving are known. Multiple events were not considered here, but effects may be greater when multiple disruptions are considered. Third, though covariates were carefully selected to minimize the bias introduced by censoring, the assumption that these covariates fully capture unobserved variation in relationship disruption is untestable. Finally, because only non-marital unions were censored, potential censoring bias applies only to unmarried respondents. It is possible that the average length of union is longer than suggested here, and the gap between married and unmarried respondents may consequently be smaller. However, there is no reason to believe censoring of non-marital cases is conditioned on infertility status.

Marriage is a complex institution, and entry into marriage may take up to several years. Parsing out timing of entry into sexual unions, cohabitation, traditional and formal ceremonies, and other substantive milestones is important for understanding how entry into marriage may influence fertility behaviour (Meekers, 1992). Bridewealth may serve as a disincentive to divorce (Takyi &

Broughton, 2006), but no measure is available in the Cape Coast data. It would be of interest to know whether the relationships found in this study hold when controlling for socioeconomic status of the natal family and the cost of the bridewealth–particularly because it is conceptualised as the purchase of reproductive capacity (Armstrong, 1997). Finally, there is a need to examine relationship disruption among men. Future studies should examine these issues cross-nationally using representative, detailed, longitudinal relationship data. Data collection on reproductive health in SSA should include measures of self-assessed infertility.

In sum, this study provides empirical evidence from Ghana that perceived difficulties conceiving may contribute to an increased risk of relationship disruption, for both married and unmarried couples. Furthermore, it appears that married couples are less likely to experience a disruption. These findings concur with previous qualitative work on the link between infertility and divorce (Leonard, 2002).While the Ghanaian case may not necessarily be representative of broader trends in SSA given the considerable sociodemographic and cultural heterogeneity across the sub-continent, this study provides much-needed empirical evidence on the association between infertility and risk of relationship disruption. Although it was not possible to examine matrilineality due to the ethnic group categories used (some matrilineal and patrilineal groups were collapsed into a single category), this may be an important issue. Previous work in Ghana suggests that women from matrilineal groups may experience higher rates of divorce, as the social cost of divorce is less for women who maintain strong kinship ties after marriage (Takyi & Gyimah, 2007). This work has not addressed whether this is true regardless of infertility status. A study of infertility among the matrilineal Macua of Mozambique shows that divorce is a very real concern among infertile women, but that in the event of divorce, the social consequences of infertility are less severe than in patrilineal groups (Gerrits, 2002). This may be an important point of overlap between Ghana and other countries in SSA, but further research on this important topic is needed.

Author's roles

The author was responsible for the study design and execution, analyses, manuscript drafting and critical discussion.

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Web Appendix

In order to assess whether the effect of infertility differs by parity and marital status, additional models were run split by each of these variables; the full models (including all covariates) are presented in the tables. It is worth noting that in some cases the cell sizes are quite small in the stratified models, resulting in wide confidence intervals and likely contributing to the limited statistical significance across the models; results of these models should be taken with caution. Web Tables I and II provide the results for parity and marital status respectively. For the sake of space, and given the similarity to previous models, bivariate associations are not provided in the tables, but are discussed here in the text. Similarly, the coefficients for the perceived infertility models controlling for 24-month infertility are included in the text but not the tables.

Web Table I shows the results for each of the three infertility variables for women with at least one child. Unfortunately, due to the low number of women at parity 0 included in the sample, it was not possible to estimate the models for women of parity 0. This is an important limitation of the current study, and future research should examine how parity may interact with infertility status (both biomedical and perceived ability to conceive) to shape the risk of relationship disruption. As with the previous models, 24-month infertility was not a significant predictor of relationship disruption in either the bivariate (OR=1.60; CI: 0.81 to 3.17) or multivariate (OR=1.25) case, but both basic (OR=4.98; CI: 2.65 to 9.37) and contracepting (OR=2.04; CI: 1.01 to 4.12) perceived infertility were significantly, positively associated with relationship disruption. In the full models, non-contracepting perceived infertility remains significant (OR=4.99), but contracepting perceived infertility is no longer a significant predictor (OR=1.70) of relationship disruption. Adding 24-month infertility as a control reduces the effect size, but non-contracepting perceived infertility is still strongly, significantly (OR=4.78; CI: 2.40 to 9.52) associated with relationship disruption, while contracepting perceived infertility remains non-significant (OR=1.22; CI: 0.44 to 3.38).

The relationship between infertility and relationship disruption split by marital status is provided in Web Table II. In the bivariate case, the association between 24-month infertility and disruption is non-significant for both married (OR=1.56; CI: 0.62 to 3.99) and unmarried (OR=0.93; CI: 0.45 to 1.90) women. Unsurprisingly, these associations remain non-significant (married

OR=1.82; unmarried OR=1.00) when the covariates are added to the model, shown in Models 1 and 2 of Table II. Note, for the coefficient for cowives in the unmarried category across models, this would apply only to women whose union transitioned to marriage during the observation period. In the bivariate case, non-contracepting perceived infertility is positively, significantly associated with relationship disruption for both married (OR=3.78; CI: 1.66 to 8.61) and unmarried (OR=4.53; CI: 1.76 to 11.65) women, though the effect is stronger for unmarried women. In the models including the sociodemographic covariates (Models 3 and 4 in Web Table II), non-contracepting perceived infertility remains a significant predictor, and the gap between married (OR=3.57) and unmarried (OR=7.49) women grows. The addition of 24-month infertility to the models somewhat diminishes the effect of perceived infertility for both married (OR=3.34; CI:1.32 to 8.44) and unmarried (OR=7.32; CI: 2.38 to 22.53) women, but the associations are still strong and significant. Turning finally to contracepting perceived infertility, perceived infertility is not a significant predictor in the bivariate case for married women (OR=1.41; CI: 0.44 to 4.59), but the association is positive and significant for unmarried women (OR=2.02; CI: 1.04 to 3.94). This association remains non-significant for married women (OR=1.36) in the models including the sociodemographic covariates, and is no longer significant for unmarried women (OR=1.80), as shown in Models 5 and 6 of Web Table II. Results remain non-significant for married (OR=0.57; CI: 0.07 to 4.46) and unmarried (OR=1.76; CI: .049 to 6.31) women in the models including 24-month infertility as a control.

[Web Tables I and II about here]

While the conclusions to be drawn from these models are quite limited, the models are suggestive of avenues for future research. The results by parity in Web Table II show that the effect sizes here are roughly equivalent to those in Table II of the main text, but are smaller than in the models in Tables III and IV, possibly suggesting an interaction between perceived infertility and parity, but *not* between 24-month infertility and parity. However, without the comparison group of women who have no children, the precise nature of this relationship is not possible to assess. For the models split by marital status, statistical power remains quite limited, but clear differences between married and unmarried women are observable, with unmarried women who perceive infertility facing a particularly high risk of relationship disruption. Though not available in the Cape Coast data set,

richer data on relationship quality and the precise nature of the relationship may identify specific subgroups of unmarried women (for example casual versus cohabiting relationships) who are especially susceptible to relationship disruption. Taken together, these additional models lend some further support to the notion that the perception of ability to conceive may be more salient in predicting social outcomes than is the underlying biological ability to conceive. However, the statistical power of the models is quite limited; further research is needed on this issue.

Web Table I

Hazard of Relationship Disruption by Parity (24 Month Models= N=1,173; pooled N=10,418; Perceived Infertility Models N=1,173; pooled N=4,827)

	24 Month Infertility Parity>0		Non-Contracepting Perceived Infertility Parity>0		Contracepting Perceived Infertility Parity>0	
	Model 1		Model 2		Model 3	
Variable	OR	95% CI	OR	95% CI	OR	95% CI
24-Month Infertility	1.25	0.58, 2.70				
Perceived Infertility			4.99***	2.52, 9.87	1.70	0.73, 3.98
Married	0.64*	0.41, 1.00	0.34***	0.19, 0.61	0.31	0.17, 0.57
Union to Marriage	0.98	0.63, 1.53	1.42	0.76, 2.64	1.56	0.82, 2.96
Age	0.99	0.85, 1.14	1.08	0.89, 1.31	1.04	0.86, 1.26
Age Squared	0.92	0.73, 1.16	0.91	0.66, 1.25	0.98	0.71, 1.33
Relationship Duration	0.97	0.91, 1.03	1.03	0.93, 1.15	1.03	0.93, 1.15
Duration Squared	0.15***	0.07, 0.30	0.19**	0.06, 0.60	0.19	0.06, 0.59
Age*Relationship Duration	1.22**	1.07, 1.41	1.01	0.80, 1.27	1.04	0.83, 1.31
Cowives	2.22*	1.09, 4.54	3.79*	1.36, 10.56	3.47	1.25, 9.66
Ethnicity						
Adangbe	1.40	0.51, 3.90	2.04	0.27, 15.18	1.79	0.24, 13.40
Ga or Ewe	1.36	0.48, 3.82	3.31	0.45, 24.49	3.15	0.43, 22.90
Denkyira	1.84	0.70, 4.84	5.27	0.77, 36.27	5.06	0.75, 34.18
Fante	1.55	0.62, 3.88	3.59	0.55, 23.39	3.75	0.58, 24.15
Ahanta or Other (ref)	1.00	--	1.00	--	1.00	--
Pseudo R-Squared		0.35		0.35		0.31

Source: Author's calculations using Cape Coast data; *p<.05 **p<.01 ***p<.001

Web Table II

Hazard of Relationship Disruption by Marital Status (24 Month Models= N=1,173; pooled N=10,418; Perceived Infertility Models N=1,173; pooled N=4,827)

	24 Month Infertility				Non-Contracepting Perceived Infertility				Contracepting Perceived Infertility			
	Married		Not Married		Married		Not Married		Married		Not Married	
	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
Variable	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR		OR	95% CI
24-Month Infertility	1.82	0.63, 5.25	1.00	0.42, 2.34								
Perceived Infertility					3.57**	1.44, 8.85	7.49***	2.45, 22.88	1.36	0.31, 5.86	1.80	0.71, 4.54
Union to Marriage	0.63	0.34, 1.19	1.06	0.55, 2.02	0.34	0.11, 1.05	3.14	0.88, 11.19	0.33*	0.11, 1.01	4.99*	1.37, 18.23
Age	1.04	0.83, 1.30	0.94	0.79, 1.12	1.25	0.91, 1.73	0.93	0.68, 1.27	1.22	0.88, 1.68	0.92	0.69, 1.22
Age Squared	0.92	0.64, 1.33	0.93	0.70, 1.24	0.86	0.54, 1.37	1.13	0.63, 2.03	0.92	0.58, 1.46	1.08	0.62, 1.88
Relationship Duration	0.92	0.84, 1.02	0.96	0.90, 1.02	1.21*	1.00, 1.47	0.98	0.88, 1.09	1.17**	0.97, 1.41	0.96	0.87, 1.06
Duration Squared	0.37	0.12, 1.12	0.22***	0.09, 0.53	0.05**	0.01, 0.33	0.42	0.11, 1.63	0.07	0.01, 0.48	0.34	0.09, 1.33
Age*Relationship Duration	1.07	0.88, 1.30	1.29	1.07, 1.56	0.80	0.59, 1.09	0.98	0.68, 1.41	0.81	0.59, 1.09	1.13	0.80, 1.60
Cowives	2.47	0.90, 6.75	1.79	0.91, 3.50	4.95*	1.14, 21.47	4.23*	1.40, 12.83	4.89*	1.03, 23.15	3.67**	1.31, 10.23
Parity												
No Children	0.91	0.35, 2.39	0.30**	0.14, 0.65	0.45	0.05, 4.06	0.21*	0.05, 0.90	0.62	0.07, 5.64	0.37	0.09, 1.41
Only One Child	1.34	0.56, 3.22	0.35**	0.17, 0.72	2.04	0.67, 6.19	0.11**	0.02, 0.54	2.20	0.71, 6.78	0.14*	0.03, 0.74
More than One Child (ref)	1.00	--	1.00	--	1.00	--	1.00	--	1.00	--	1.00	--
Ethnicity												
Adangbe	2.59	0.51, 13.15	0.78	0.27, 2.25	1.96	0.15, 24.96	0.91	0.11, 7.80	1.57	0.12, 20.13	1.04	0.13, 8.21
Ga or Ewe	3.88	0.75, 20.09	0.66	0.19, 2.26	7.45	0.69, 80.12	1.07	0.11, 10.70	6.83	0.65, 72.39	1.02	0.10, 10.05
Denkyira	3.06	0.60, 15.75	1.24	0.45, 3.40	4.46	0.48, 41.49	2.81	0.31, 25.51	4.13	0.43, 39.28	2.58	0.31, 21.36
Fante	3.07	0.68, 13.97	0.74	0.28, 1.99	3.40	0.42, 27.63	1.29	0.17, 9.86	3.55	0.43, 29.00	1.36	0.19, 9.61
Ahanta or Other (ref)	1.00	--	1.00	--	1.00	--	1.00	--	1.00	--	1.00	--
Pseudo R-Squared		0.37		0.17		0.32		0.28		0.30		0.25

Source: Author's calculations using Cape Coast data; *p<.05 **p<.01 ***p<.001