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Associates of self-reported fertility status and infertility treatment-seeking in a rural district of Malawi

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BACKGROUND: This study examines the demographic, fertility preference, health/infection and behavioural factors associated with self-reported fertility problems and infertility treatment-seeking in a rural district of Malawi. METHODS: Data come from a population-based survey of 678 women and 362 men. RESULTS: Having a higher ideal number of children than actual number of children, i.e. a 'child deficit', is highly associated with women's reported fertility impairment and treatment-seeking. Other factors associated with women's infertility treatment-seeking are being educated and reporting infertility in self or spouse. In contrast, being in a polygamous union, having exchanged money or goods for sex, and having multiple sex partners are significantly associated with men's reported fertility impairment. Significant factors associated with men's infertility treatment-seeking are having no education, having a long waiting time to pregnancy and having a 'child deficit'. CONCLUSIONS: There is a sex difference in which factors are associated with reported fertility impairment. Fertility preference variables are more often significantly related to women's reported fertility impairment, whereas sexual behaviours are more often significantly related to men's reported fertility impairment.

Key words: Africa/fertility impairment/infertility/self-reports/treatment-seeking

Introduction

Impaired fertility affects millions of women and men throughout sub-Saharan Africa. In settings where becoming a parent is integral to entering adulthood and where children represent a source of wealth by assisting in the maintenance and economic production of the household, fertility problems can have serious negative consequences for those affected. Some of the documented consequences of infertility, i.e. the inability to bear children, can include marital instability, abuse, neglect, social stigma, discrimination, banishment from religious ceremonies and poverty (Gerrits, 1997; Pearce, 1999; Gijsels *et al.*, 2001; Mgalla and Boerma, 2001; Dyer *et al.*, 2002, 2004).

Malawi is a small country in southern Africa, bordered by Tanzania, Mozambique, Zambia and Lake Malawi. The population of the country is almost 11 million, most of whom (85%) live in rural areas. As in many countries of this region, fertility and fertility desire remain high in Malawi. The total fertility rate (TFR) is estimated at 6.3 births per woman, while the average ideal family size is 5.3 for married women and 5.4 for married men [National Statistical Office (Malawi) and ORC Macro, 2001]. The most recent estimates of infertility in Malawi show a level of primary infertility, or childlessness, in women aged 20–44 of 2% as measured by the proportion of women who remained childless after at least 7 years of marriage (Larsen and Raggers, 2001). However, secondary infertility, or infertility subsequent to the birth of at least one child, was much higher, at 17%, ranging from a low of 7% in women aged 20–24 to 60% in women aged 40–44. These figures put Malawi in the upper-middle range of infertility prevalence as compared to other sub-Saharan African countries. Until now, examinations of fertility difficulties that move beyond estimating the number of infertile and subfertile women in Malawi have not been made.

A number of factors associated with infertility and subfertility, i.e. very low fertility, in the sub-Saharan region have been identified. For the purposes of this analysis, these factors are categorized as demographic, health/infection and behavioural, though it is acknowledged that some, such as age, may cross-cut categories. First, certain demographic characteristics, such as age, marital status, ethnicity, religion, region of residence and level of education, have been identified in population-based surveys as being related to differences in observed fertility (Larsen, 1995; Ericksen and Brunette, 1996). Second, health factors that can be assessed by a survey and that are known to cause a large proportion of fertility problems in Africa are related to reproductive tract infections, especially those caused by sexually transmitted infections (STIs), including gonorrhoea, chlamydia, trichomoniasis and syphilis (Mayaud, 2001). Human immunodeficiency virus (HIV) has also been found to be associated with

infertility and subfertility among women and men in this region (Zaba and Gregson, 1998; Boerma and Urassa, 2001; Ikechebelu *et al.*, 2002). In addition, reproductive tract infections resulting from obstetric procedures, such as abortions, are also known to cause infertility (Mayaud, 2001). Finally, certain sexual behaviours, such as having multiple partners or having first sexual experience at an early age, increase the risk of acquiring STIs, including HIV, and have been found to be associated with fertility problems (Duncan *et al.*, 1990; Larsen, 1995; Ericksen and Brunette, 1996; Ikechebelu *et al.*, 2002).

Population-based research on fertility problems in Africa usually relies on birth history data collected in large surveys, such as the World Fertility Survey or the Demographic and Health Survey. Such studies are useful for spatial and temporal trend analyses within and across various populations in Africa, as well as for identifying a number of factors related to infertility and subfertility. However, another way to assess fertility problems in a population-based survey is to use self-reports of fertility status. To the extent that an individual's perceived fertility status may influence decisions regarding sexual activity, contraceptive use and treatment-seeking behaviour, a self-reported measure also provides useful information on the impact that fertility problems have on other reproductive behaviours. In developed countries, self-reported measures have been found to provide valuable estimates of fertility impairment (Dick *et al.*, 2003), though they have been suggested to underestimate infertility in developing countries (Vaessen, 1984).

This paper assesses the characteristics of women and men who self-report a fertility problem, and in doing so attempts to determine whether these characteristics have a similar relationship to self-reported fertility status as they do to ascribed fertility status, i.e. fertility status as determined by the application of a standard definition. A number of psychological and behavioural factors are associated with the under-reporting of reproductive morbidities (Sadana, 2000). In relation to self-reported fertility status, under-reporting may be influenced by factors such as fertility expectations, preferences and desires, which are generally high in sub-Saharan Africa. Due to the context of high fertility there is a strong social stigma attached to infertility, which may result in the under-reporting of fertility problems. Subfertile women who have high fertility demand may also under-report fertility problems, choosing not to label themselves as infertile if they hope to still have children. This study addresses this issue by including measures of fertility preference, among other relevant factors, to examine the characteristics of individuals reporting fertility difficulties and treatment-seeking in a rural district of Malawi.

Specifically, this study investigates the association between women's and men's reports of difficulty in becoming pregnant (or getting their partner pregnant) and relevant demographic, fertility preference, health/infection and behavioural factors. In addition, among those who report difficulties in becoming pregnant, this study examines the associations between women's and men's reports of infertility and infertility treatment-seeking, and the relevant demographic, fertility preference, health/infection and behavioural factors. The terms 'fertility difficulties' and 'fertility problems' are used interchangeably throughout the paper to reflect the range of fertility impairment that is contained in the data, which includes both perceived difficulty in getting pregnant and perceived infertility.

Materials and methods

Study setting

The study takes place in Mangochi, a rural district located in southern Malawi around the tip of Lake Malawi. This district is one of the poorest in the country, where subsistence farming and fishing is the most common occupation. Although there is wide variation in fertility rates in Malawi, the highest TFR is in Mangochi at 7.4 births per woman [National Statistical Office (Malawi) and ORC Macro, 2001]. Mangochi district is fairly homogenous as to religion and ethnicity as most residents are Muslim and belong to the Yao tribe. Educational attainment and literacy is low in this region of the country, especially among women, where almost 50% of women and 20% of men cannot read at all [National Statistical Office (Malawi) and ORC Macro, 2001]. Approximately 21% of women in Mangochi are in a polygamous union (Center for Social Research *et al.*, 2004).

Data

The data for this study come from the Malawi Pregnancy and STI Risk Perception and Avoidance Study, conducted by the Carolina Population Center, University of North Carolina, Chapel Hill and Save the Children Federation/USA in conjunction with the Centre for Social Research at the University of Malawi (Center for Social Research *et al.*, 2004). The main purpose of the study was to use longitudinal data to assess the levels of perceived risk for unwanted pregnancy and/or STIs and their relationship to sexual activity and avoidance behaviours. The study used a prospective cohort design to collect data in Mangochi district in three waves from June 2000 to June 2002. A multistage probability sampling design was used to select a representative sample of the district. Eligible participants were women aged 15–34 and men aged 20–44 at baseline. Participants were interviewed once in a week for a total of six consecutive weeks in 2000 during the first wave of data collection for the study. The weekly interviews collected data on a broad spectrum of reproductive issues, including fertility intentions and desires, current and past sexual behaviour, knowledge of STIs and HIV, family planning use and weekly sexual activity reports. The second and third waves of the study were conducted in 2001 and 2002 and collected follow-up information from respondents regarding these topics. Additional questions on the perceptions of fertility impairment and infertility treatment-seeking were added to the survey for the third wave of data collection. Gonorrhoea and chlamydia tests from urine samples were collected during the first and third waves of data collection; HIV tests were conducted from urine samples collected from the third wave.

There were 1013 women and 737 men interviewed in the first week of the first wave of data collection, while 727 women (72% of original sample) and 451 men (61%) were interviewed in the third wave of data collection.[1] The analysis sample is further reduced to

[1]Most attrition occurred during the first wave of the study, between the first and second weeks: compared to the second week of the first wave of data collection, the response rate at the third wave is 94% for women and 93% for men.

include only those participants who were asked about their fecundity status, i.e. those 678 women and 362 men who had children or had attempted to become pregnant (or get their spouse pregnant). The study received approval from the Institutional Review Board at the University of North Carolina at Chapel Hill School of Public Health and was approved locally by the National Health Sciences Research Committee in April 2000 and August 2001.

Construction of variables

The dependent variables for this analysis measure (1) whether an individual reports ever experiencing a difficult time in getting pregnant and (2) whether they consider themselves or their partner to be infertile. The second variable measures perceived infertility only among individuals who reported a difficult time in getting pregnant ($n = 133$ women and $n = 71$ men). The treatment-seeking behaviour of individuals reporting fertility difficulties was ascertained by asking if the respondent or their partner had ever sought help to become pregnant, and if so, from whom help was sought.

Demographic, fertility preference, health/infection and behavioural data from the third wave of data collection were used to construct the independent variables, except for information on miscarriages/stillbirths, which was collected in the sixth week of the first wave of data collection, and the results of the STI tests from the first wave of data collection. The demographic characteristics included in the analyses are the following: age, included as a continuous variable; level of education, coded dichotomously as any versus none; household income, categorized into quintiles with the lowest and highest quintiles being compared against the middle range; whether the respondent is currently in a polygamous union, coded as yes/no, and thus reflecting information about any wife; and ever given birth, coded as yes/no.

Three measures of fertility preferences were assessed. The first is the desire for additional children. Respondents were asked about their desire for additional children by inquiring as to whether they would like to have a (another) child or if they would not like to have any (more) children. The variable was coded as yes/no, with the 'no' category including answers of do not know/unsure. A second measure of fertility satisfaction was constructed by subtracting the respondent's actual number of children from their reported ideal number of children. As such, it is a useful measure of fertility desire that is likely influenced by social norms. A 'child deficit' is considered to occur when the ideal number of births outnumbers the actual number of births for those individuals who have been exposed to sexual intercourse for at least 5 years. The variable is coded as those with a 'child deficit' versus all others. The death of a child can also encourage parents to want more children, especially in areas like Mangochi, where infant and child mortality are high (known as 'replacement' strategy). In recognition of this child-bearing motivation, the last measure of fertility preference considers whether the respondent has ever had a child death, which is assessed by subtracting the number of living children from the number of live births reported by each respondent. Those who have had one or more children die are compared against all others.

Two of the health variables included in the analysis were asked to women only: whether they ever had a miscarriage, stillbirth or abortion, coded as yes/no and whether they had ever experienced irregular menstrual bleeding, coded as yes/no. Ever use of contraception was assessed by asking women and men if they had ever tried to delay a birth or use contraception, coded as yes/no. The usual waiting time to pregnancy was assessed by asking respondents how long it usually takes them or their partner to become pregnant. Responses were given in terms of months or years, those greater than 12 months or 1 year are compared to all others.

The STI status was measured by using biomarkers for chlamydia and gonorrhoea. Urine specimens were collected from consenting respondents and transported to the sexually transmitted diseases (STD) unit laboratory at Lilongwe Central Hospital. Trained technicians used Abbott LCx ligand chain reaction assays, which are highly sensitive and specific compared to cultures, to detect chlamydia trachomatic plasmid and gonococcal DNA. Almost three-fourths of all respondents (72% of women and 73% of men) agreed to provide urine samples to be tested for chlamydia and gonorrhoea. A dichotomous yes/no variable on STI status was constructed by using the test results for those who tested positive to either chlamydia or gonorrhoea versus those who were not tested or received negative results. HIV status was first assessed through the use of Caltype HIV-1 urine EIA tests. Specimens that were repeatedly reactive were then tested by using a western blot test kit. The specimens that were positive for both tests were classified as positive. The specimens that were positive for the EIA test but negative with the western blot were classified as negative. Specimens that were positive with the EIA but inconclusive with the western blot were classified as indeterminate. Fifty-six percent of women and 65% of men agreed to be tested for HIV. Those who were tested positive or indeterminate for HIV are compared against those who tested negative or were not tested. It is acknowledged that the inclusion of non-tested individuals in the denominator of the variable may dilute the effects, if individuals declining to be tested were in fact HIV positive.

Three measures related to sexual behaviour are also included in the analysis. The survey asks women and men to report on the number of different sex partners they have had in their lifetime. These numbers were categorized based on the distribution of responses into three and above versus all others for women, and ten and above versus all others for men. The variable for age at first sex has been dichotomously categorized into age 14 and below versus all others, as an age at first sex below 14 has been associated with increased risk of contracting STIs and becoming infertile (Duncan *et al.*, 1990). The last indicator of sexual behaviour that is included in the analysis is whether the respondent has ever exchanged money, goods or gifts for sex, coded as yes/no.

Analysis

The relationships between independent variables (demographic, fertility preference, health/infection and behavioural) and reported fertility status are first examined by using Pearson's χ^2 and one-way analysis of variance to assess the degree of association at a 90, 95 and 99% level of significance. Next, multivariate logistic regression analyses are used to determine the degree to which the above-mentioned indicator variables are associated with a self-report of a difficulty in getting pregnant and infertility in self or spouse. Finally, multivariate logistic regression analysis is used to determine the degree to which certain indicator variables are related to infertility treatment-seeking behaviours. All regression models in the analysis were run separately for women and men. Prior to building the multivariate models, associations between predictor variables were examined. Spearman's ρ was used to assess independence among categorical variables. This examination revealed that none of the independent variables were highly associated for either women or men (<0.5). The final regression models were built by using backward selection to include only those predictor variables with at least a moderate degree of association with the outcome variable (a *P*-value of less than 0.3). All analyses were run on STATA/SE version 8.2.

Results

Difficulties in becoming pregnant (or getting one's partner pregnant) were reported by 133 women and 71 men, resulting in a prevalence of 19.6% for both sexes. Among those reporting a difficulty, 50 women (37.6%) and 19 men (26.8%) suspected infertility in self or spouse, which translates into an overall prevalence of reported infertility of 7.4% of all women and 5.2% of all men included in the study. Self-identified infertility varied greatly by sex; of the 19 men reporting infertility none was certain that they were the infertile partner, whereas 30 of the 50 women (60%) were certain that they were the infertile one. Table I shows that only 9% of women reporting fertility difficulties ($n = 12$ of 133) never had any children (i.e. are suffering from primary infertility), while almost one in four women reporting infertility ($n = 12$ of 50) did not have any children. The percentages are slightly higher for men, for whom 11% of those reporting difficulties and 32% reporting infertility do not have children. Overall, if these women and men remain childless, the primary infertility rate according to the surveyed population would be 1.8% for women and 2.2% for men, both estimates being close to the national estimate of 2% (Larsen and Raggers, 2001). This signifies that the majority of reported fertility difficulties are for individuals with at least one child. In fact, the mean number of children for those with fertility difficulties who have had at least one birth is 2.7 for women and 4 for men. Around three-fourths of the sample are currently married or in union, of these 22% of women and 15% of men report being in a polygamous union. Since polygamy is practised, it is worth noting that the number of children reported by men can include children with other women than the one reported to have had fertility difficulties.

An examination of fertility preferences shows that most of the study samples desired more children or are categorized with having a 'child deficit', although there is a greater percentage of individuals with a 'child deficit' among individuals reporting fertility difficulties as compared to individuals without fertility difficulties. Of the health characteristics considered, women who have ever had a miscarriage or stillbirth are slightly less likely to report fertility difficulties. The table also shows that for women, there is a significant association between perceived fertility difficulties and a usual waiting time to pregnancy of more than 1 year. For men, the variation is not statistically significant. Approximately half of the survey population reports having tried to delay a pregnancy or use birth control, though the percentage is consistently

Table I. Demographic, fertility preference, health/infection and behavioural characteristics of women and men in Mangochi district, by self-reported fertility status[a]

	All women ($n = 678$)	Women reporting difficulty in getting pregnant ($n = 133$)	Women reporting self or partner infertile[b] ($n = 50$)	All men ($n = 362$)	Men reporting partner's difficulty in getting pregnant ($n = 71$)	Men reporting self or partner infertile[b] ($n = 19$)
Demographic characteristics						
Age (years)[c], mean (SD)	26.8 (5.2)	27.9 (4.8)	27.9 (4.5)	32.5 (8.3)	34.3 (10.5)	34.2 (6.4)
Education, *n* (%)						
None	324 (47.8)	68 (51.1)	27 (54.0)	118 (32.6)	22 (31.0)	6 (31.6)
Any	354 (52.2)	65 (48.9)	23 (46.0)	244 (67.4)	49 (69.0)	13 (68.4)
Income, *n* (%)						
Lowest quintile	164 (24.4)	31 (23.8)	10 (20.4)	83 (23.1)	20 (28.2)	1 (5.3)**
Highest quintile	121 (18.0)	24 (18.5)	11 (22.5)	85 (23.6)	15 (21.1)	7 (36.8)*
In polygamous union, *n* (%)	151 (22.3)	36 (27.1)	14 (28.0)	53 (14.6)	17 (23.9)*	5 (26.3)
Never had children	24 (3.5)	12 (9.02)**	12 (24.0)**	18 (5.0)	8 (11.3)**	6 (31.6)**
Number of children of those with at least one live birth, mean (SD)	3.1 (2.0)	2.7 (1.6)	2.2 (1.4)	3.7 (2.7)	4.0 (3.6)*	3.9 (3.4)
Fertility preference, *n* (%)						
Wants more children	492 (72.6)	107 (80.5)*	37 (74.0)	241 (66.6)	50 (70.4)	14 (73.7)
Child deficit	418 (61.7)	111 (82.5)**	46 (92.0)	186 (51.4)	40 (56.3)	14 (73.7)
Ever had a child die	210 (31.0)	47 (35.3)	16 (32.0)	165 (45.6)	33 (46.5)	8 (42.1)
Health/infection characteristics, *n* (%)						
Ever had a miscarriage	108 (15.9)	20 (15.0)	7 (14.0)	NM	NM	NM
Ever had irregular menstruation	195 (28.8)	38 (28.6)	17 (34.0)	NM	NM	NM
Usual waiting time until pregnancy longer than 1 year	159 (23.5)	50 (37.6)**	13 (26.0)*	56 (15.5)	15 (21.1)	5 (26.3)
Ever used contraception	330 (48.7)	38 (28.6)**	8 (16.0)*	188 (51.9)	30 (42.3)	5 (26.3)*
Positive STI test	51 (7.5)	9 (6.8)	1 (2.0)	31 (8.6)	7 (9.9)	1 (5.3)
Positive HIV test	91 (13.4)	26 (19.6)*	13 (26.0)*	54 (14.9)	14 (19.7)	5 (26.3)
Behavioral factors						
More than three sex partners	175 (25.8)	45 (33.8)*	20 (40.0)	NM	NM	NM
More than 10 sex partners	NM	NM	NM	122 (33.7)	26 (36.6)	10 (52.6)
Age at first sex $\leq$14 years	168 (24.9)	41 (30.8)	14 (28.0)	82 (22.7)	18 (25.4)	4 (21.1)
Everexchanged money for sex	53 (7.8)	10 (7.5)	6 (12.0)	133 (36.7)	37 (52.1)**	12 (63.2)

NM = variable not measured. STI = sexually transmitted infection.
*P-value < 0.05.
**P-value < 0.01 using Pearson's χ^2-test of association and one-way analysis of variance between group means.
[a]Among women and men who have ever given birth or tried to become pregnant.
[b]Among women and men who reported a difficulty in getting pregnant.
[c]Age variable is missing one observation for women; income variable is missing seven observations for women and two for men.

higher among men than women. The percentage of those who have used birth control is significantly diminished according to self-reported difficulties and infertility (only 16% of women and 26.3% of men with reports of infertility).

There is no clear pattern to the relationship of positive gonorrhoea and chlamydia test results and self-reported fertility difficulties. However, there is a clear linear pattern of positive HIV test results and reported fertility status. The assessment of behavioural factors indicates that, like HIV status, linear patterns are evidenced in the relationships between fertility status and a high number of sexual partners and ever having exchanged money/goods for sex, especially among men.

Table II presents the results of the regression of demographic, fertility preference, health/infection and behavioural factors on the difficulty in getting pregnant for the surveyed women and men. For women, the variables significantly related to self-reports of fertility difficulties are having a 'child deficit' after five or more years of exposure to pregnancy [OR = 3.78, confidence interval (CI) = 2.25–6.37] and having a long waiting time until pregnancy (OR = 2.24, CI = 1.43–3.51). Women who tested positive for HIV were 60% more likely to report a fertility difficulty than women who tested negative or who did not get tested, though the relationship is not significant at 95%. The results also show that women who perceive fertility problems are significantly less likely to have ever given birth (OR = 0.16, CI = 0.06–0.42) or to have used a method of family planning (OR = 0.45, CI = 0.29–0.70).

For men, ever having exchanged money/goods for sex is highly related to reporting fertility difficulties and is the only sexual behaviour indicator to be statistically significant (OR = 2.1, CI = 1.21–3.67). In addition, being in a polygamous union was highly associated with reporting fertility difficulties (OR = 2.02, CI = 1.02–3.99).

Table III presents the results of the subset analysis of self-reported infertility among those reporting a difficulty in getting pregnant. Infertility is significantly more likely to be reported by women who have a 'child deficit' (OR = 3.92, CI = 1.06–14.54). It is less likely to be reported by women who have used family planning or report a waiting time to pregnancy of more than 1 year. For men, the only factors with significant positive associations with reported infertility are being in the highest income group (OR = 9.72, CI = 1.69–56.0) and having multiple sex partners (OR = 12.43, CI = 1.86–82.89). Though both of these variables have large odds ratios, the CIs are very wide, so they should be interpreted with caution. None of the fertility preference variables remains in the men's model except the death of a child (OR = 2.60, CI = 0.51–13.25). Also, none

Table II. Associations between self-reported difficulty in getting pregnant (or getting partner pregnant) and demographic, fertility preference, health/infection and behavioural characteristics

Factor[a]	Women ($n = 676$)[b], OR (95% CI)	Men ($n = 360$)[b], OR (95% CI)
Demographic characteristics		
Age	1.03 (1.00–1.08)	1.04 (1.00–1.08)*
Lowest 20% income	NI	1.4 (0.76–2.61)
In polygamous union	NI	2.02 (1.02–3.99)*
Has ever given birth/fathered a child	0.16 (0.06–0.42)**	0.19 (0.07–0.53)**
Fertility preferences		
Wants more children	NI	1.53 (0.81–2.87)
Child deficit and more than 5 years since first sex	3.78 (2.25–6.37)**	NI
Death of ≥1 child	1.43 (0.91–2.27)	NI
Health/infection characteristics		
> 1 year waiting time to pregnancy	2.24 (1.43–3.51)**	NI
Tried to delay pregnancy or use contraception	0.45 (0.29–0.70)**	NI
Positive HIV test result	1.61 (0.92–2.79)	1.51 (0.73–3.11)
Behavioural factors		
High number sex partners in lifetime (≥3 for women and ≥10 for men)	1.43 (0.90–2.25)	NI
Exchanged money/goods for sex	NI	2.1 (1.21–3.67)**
χ^2	0.0000	0.0002
R^2	0.14	0.08

NI = variables not selected for inclusion into final regression model (P-value > 0.3).
*P-value < 0.05.
**P-value < 0.01.
[a]All factors were considered for selection into the final regression model; only those selected for inclusion into either women's or men's final model are shown in the table.
[b]Two observations for men and women are missing data on household income and/or age.

Table III. Association between self-reported infertility and demographic, fertility preference, health/infection and behavioural characteristics among those reporting fertility difficulties

Factor[a]	Women ($n = 130$)[b], OR (95% CI)	Men ($n = 71$), OR (95% CI)
Demographic characteristics		
Age	NI	1.04 (0.97–1.11)
Highest 20% income	2.60 (0.86–7.89)	*9.72 (1.69–56.00)**
In polygamous union	0.55 (0.20–1.48)	2.73 (0.51–14.6)
Has ever given birth/fathered a child	NI	0.00 (0.00–0.09)**
Fertility preferences		
Wants more children	0.36 (0.12–1.06)	NI
Child deficit and more than 5 years since first sex	*3.92 (1.06–14.54)**	NI
Death of ≥1 child	1.50 (0.59–3.77)	2.60 (0.51–13.25)
Health/infection characteristics		
> 1 year waiting time to pregnancy	0.30 (0.12–0.74)**	NI
Tried to delay a pregnancy or use contraception	0.20 (0.07–0.57)**	NI
Positive STI test result	0.16 (0.01–1.70)	NI
Positive HIV test result	2.18 (0.74–6.42)	2.55 (0.51–12.83)
Behavioural factors		
High number sex partners in lifetime (≥3 for women and ≥10 for men)	NI	*12.43 (1.86–82.89)**
χ^2	0.0003	0.0003
Pseudo R^2	0.18	0.33

NI = variables not selected for inclusion into final regression model (P-value > 0.3). Italicized ORs and CIs should be interpreted with caution.
*P-value < 0.05.
**P-value < 0.01.
[a]All factors were considered for selection into the final regression model; only those selected for inclusion into either women's or men's final model are shown in the table.
[b]Three observations for women are missing data on household income.

of the health/infection factors is included in the final model except testing positive for HIV, which though not statistically significant, also has a large odds ratio (OR = 2.55, CI = 0.51–12.83). Ever having given birth is associated with a significant decrease in reported infertility (OR = 0, CI = 0.0–0.09).

Slightly less than 60% of women (77 of 133) and men (40 of 71) reporting fertility difficulties sought treatment for the problem. The overwhelming majority of treatment was sought from a traditional healer (74.7% of help sought by women and 80% of help sought by men), supporting findings from other countries in sub-Saharan Africa (Pool and Washija, 2001). Formal health care providers were consulted more often by women than men (18.4% versus 12.5%), and friends, relatives and other community members were consulted by less than 10% of either women or men.

The results of the regression of demographic, fertility preference, health/infection and behavioural factors on infertility treatment-seeking is shown in Table IV. Here we see that having any education is significantly associated with a greater likelihood of seeking treatment in women (OR = 2.76, CI = 1.26–6.08), although the inverse is true for men (OR = 0.13, CI = 0.03–0.54). Reported infertility in self or spouse also significantly increases the likelihood of seeking treatment by a factor of 2.5 (OR = 2.47, CI = 1.09–5.55). Being in a polygamous union, having a 'child deficit', experiencing the death of a child, and having multiple sex partners are other factors to be positively, though not significantly, associated with infertility treatment-seeking among women.

Men whose partners have a usual waiting time until pregnancy of more than 1 year are more likely to have sought treatment (OR = 6.73, CI = 1.44–31.40), as are those with a 'child deficit' (OR = 5.36, CI = 1.29–22.27). Again, as a consequence of the small sample size, the CIs are wide enough that interpretation of the actual strength of the association should be made with caution. Other factors with a positive though non statistically significant relationship to treatment-seeking are being in a polygamous relationship, experiencing the death of a child, having a 'child deficit' and testing positive for HIV.

Discussion

The above results show that despite having the highest TFRs in Malawi, perceived fertility problems are common in this district: one in five individuals surveyed who had been pregnant or had tried to become pregnant reported an experience of a fertility difficulty. However, despite the high number of perceived difficulties, there were substantially fewer reports of infertility. This result indicates that perceived fertility problems do not necessarily translate into perceived infertility; though this result may be influenced by an unwillingness to self-label as infertile, perhaps caused by the continued desire to have more children and/or the social stigma of admitting to be infertile. Thus, measures of self-reported difficulty in getting pregnant, rather than infertility, may provide a more comprehensive indicator of the burden of fertility problems for African populations, especially as almost 60% of individuals in this study reporting difficulties sought treatment for their problem.

The data come from a study that was not specifically designed to assess fertility impairment. As a result, information that could help to establish the temporal relationship between associates and reports of fertility impairment was not collected. Nevertheless, the study identified a number of individual factors associated with Malawian women's and men's self-reported difficulty in getting pregnant, infertility and infertility treatment-seeking. Characteristics such as having a long waiting time to pregnancy, non-use of family planning and never having given birth, were found to be significantly related to self-reported fertility problems, just as they are to other measures of subfertility and infertility. Additionally, this analysis found important differences between women and men in the individual characteristics associated with reporting fertility problems. Firstly, certain sexual behaviours, particularly having had multiple sex partners and ever exchanging money/goods for sex, were significantly associated with reported fertility impairment in men only. Then, fewer fertility preference variables were significantly associated with reported fertility impairment among men as compared to women. In fact, only the treatment-seeking model contained a significant fertility preference variable for men, that of having a 'child deficit'.

Though the study took place in a region of Malawi with high fertility and high fertility desire, overall, fertility preferences were not found to be important predictors of

Table IV. Association between demographic, fertility preference, health/infection and behavioural characteristics and treatment-seeking for women and men reporting fertility difficulties

Factor[a]	Women ($n = 133$), OR (95% CI)	Men ($n = 71$), OR (95% CI)
Demographic characteristics		
Any education	2.76 (1.26–6.08)*	0.13 (0.03–0.54)**
In polygamous union	1.80 (0.75–4.35)	2.19 (0.54–8.85)
Has ever given birth/fathered a child	NI	0.22 (0.03–1.68)
Fertility preferences		
Child deficit and more than 5 years since first sex	1.72 (0.62–4.80)	5.36 (1.29–22.27)*
Death of ≥1 child	2.05 (0.87–4.80)	2.22 (0.57–8.62)
Health/infection characteristics		
Reported infertility in self or spouse	2.47 (1.09–5.55)*	NI
>1 year waiting time to pregnancy	NI	*6.73 (1.44–31.40)**
Positive HIV test result	NI	3.71 (0.83–16.67)
Behavioural factors		
High number sex partners in lifetime (≥3 for women and ≥10 for men)	1.86 (0.81–4.80)	NI
χ^2	0.0019	0.0009
Pseudo R^2	0.12	0.25

NI = variables not selected for inclusion into final regression model (P-value > 0.3). Italicized ORs and CIs should be interpreted with caution.
*P-value < 0.05.
**P-value < 0.01.
[a]All factors were considered for selection into the final regression model; only those selected for inclusion into either women's or men's final model are shown in the table.

self-reported fertility status. In this population of young women, wanting additional children was so common that there was no difference between those who reported a difficulty in getting pregnant and those who did not. Having a higher ideal family size than actual family size was used as another measure of fertility satisfaction. The 'child deficit' emerged as the only preference variable that was significantly associated with the reports of fertility difficulties and infertility. Although fertility preference variables were not significant for men's reports of fertility impairment, the fact that being in a polygamous union was consistently and positively associated with men's reports of fertility impairment suggests that the men more likely to want many children were fulfilling their preferences by having children with more than one partner.

Given the relationship between STIs and secondary infertility in Africa, there was surprising little association of these with either reported difficulties in becoming pregnant or infertility. This is likely due to a number of issues, the first of which is the use of a singular measure of STI status (which was effectively lagged 2 years, as very few STI cases were diagnosed in third wave of the study following the treatment of positive cases from first wave). Although not possible with this data source, and notoriously difficult to measure by survey, a reliable estimate of each individual's STI history may have produced stronger relationships with reported fertility impairment. In addition, the unknown status of individuals refusing the tests (almost one-fifth of women and one-third of men) may have biased the relationship. Lastly, this study was only able to account for two STIs, though there are others that are also associated with fertility problems, which may have also contributed to the weak associations.

Testing positive for HIV had a positive though non-significant association with reported fertility impairment (at 95% confidence). The inclusion of non-tested individuals in the denominator of the HIV variable may have impacted the significance of the variable in the regression models. Nevertheless, due to the cross-sectional use of the data, and the fact that infertility can both lead to and be a consequence of HIV infection, the most one can conclude from these associations is that there is a need for both counselling individuals with perceived fertility problems on ways to avoid contracting and spreading HIV, as well as a need to provide education on the potential fertility-reducing effects of the HIV virus. In Malawi, as in other sub-Saharan African countries where HIV prevalence is high and fertility demand is also high, these topics should be interwoven.

Finally, the analysis of factors associated with treatment-seeking among individuals with perceived fertility difficulties suggests segments of the population for which educational campaigns can be addressed. Of the almost 60% of individuals expressing difficulties getting pregnant and seeking help, most went to see a traditional healer. This is a common pattern of infertility treatment-seeking in sub-Saharan Africa, especially in areas where formal health care provides very limited treatment options. Although traditional healers represent the first line of treatment sought by most individuals in this survey, the strong positive effect of education on the treatment-seeking of women, who are the most likely to seek infertility treatment, suggests an alternative setting for disseminating information about the causes of fertility problems, infertility prevention behaviours and the effective treatment options available in the area.

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