

An assessment of childbearing preferences in Malawi

Kazuyo Machiyama^a, Angela Baschieri^b, Dube Albert^c Amelia C. Crampin^{a,d}, , Judith R. Glynn^a, Neil French^e, John Cleland^a

^a Faculty of Epidemiology and Population Health, London School of Hygiene and Tropical Medicine

^b University of Southampton

^c Community Health Department, College of Medicine, University of Malawi

^d Karonga Prevention Study, Malawi

^e Institute of Infection and Global Health, University of Liverpool

Corresponding author

Kazuyo Machiyama

Faculty of Epidemiology and Population Health, London School of Hygiene and Tropical Medicine

Keppel Street London, WC1E 7HT, UK

kazuyo.machiyama@lshtm.ac.uk

ACKNOWLEDGEMENTS

We would like to thank the entire Karonga Prevention Study (KPS) members of staff for their dedication during data collection and The Wellcome Trust, Joint Hewlett and Economic and Social Research Council for the funding to carry out this research, the National Health Sciences Research Committee (NHSRC) for approving the research, and STEP-UP (Strengthening Evidence for Programming on Unintended Pregnancy) Research Consortium funded by the UK Department for International Development for partially supporting salaries.

ABSTRACT

Fertility preferences are an essential component of family planning evaluation. However, doubts about their validity in Sub-Saharan Africa exist and little methodological assessment has been carried out. This study investigated prospective fertility intentions in terms of their temporal stability, intensity, degree of spousal agreement and association with future childbearing in Northern Malawi. A total of 5,618 married women participated in the three round study. The predicted probability of having a child or becoming pregnant within 36 months was 0.33 when both wife and husband wanted to stop childbearing, 0.47-0.48 when only one spouse wanted to stop and 0.63 when both wanted to continue childbearing. The influence of preferences of husbands and wives on subsequent fertility was equal. Compared with the intention to stop, the intention to postpone childbearing for three or more years was less stable, recorded less spousal agreement and was much less strongly predictive of fertility. (148 words)

INTRODUCTION

The central aim of family planning programs is to address unmet need for family planning and thereby reduce unintended pregnancies. Both of these outcomes require survey information on reproductive preferences, which is typically elicited in three main ways: a question on total desired family size; prospective questions on whether another child is desired and, if so, when; and retrospective questions on whether recent births were wanted, mistimed or unwanted at time of conception. Calculations of unmet need require data on both prospective and retrospective preferences together with contraceptive use (Bradley et al. 2012). Unwanted fertility estimates can be made from any of the three types of preference data. Information on total desired family size is used to identify births in excess of desires, from which unwanted fertility rates can be generated and reported (Westoff 2010). An alternative method of estimating unwanted fertility based on prospective information has been proposed by Casterline and El-Zeini (2007). The retrospective information provides direct estimates of unwanted (and mistimed) childbearing and, in conjunction with abortion data, has been used to determine levels and trends in unintended pregnancies (Singh et al. 2010).

These three main methods of measuring unwanted births yield very different results. In a comparison of six Demographic and Health Surveys (DHSs), the Casterline and El-Zeini method gave the highest proportions of births that were unwanted in all six surveys and the retrospective method usually gave the lowest proportions (Casterline and El-Zeini 2007). The reason for the differences is clarified by longitudinal studies. These invariably show that a large proportion of births occurring to women who stated at baseline that they wanted no more children were retrospectively classified as wanted or mistimed (Koenig et al. 2006, Speizer et al. 2013, Westoff and Bankole 1998, Casterline et al. 2003, Jain et al. 2014). The usual interpretation of this discrepancy is *ex post* rationalization but it is also likely to reflect in part a genuine difference between an abstract preference before an event, such as pregnancy, has occurred and a more emotional reaction to the event. Whatever the reasons, clearly no consensus exists on how best to obtain valid estimates of unwanted childbearing from DHS data and this verdict also holds for the United States where the topic has attracted considerable attention from social psychologists as well as demographers (e.g. Campbell and Mosher 2000, Santelli et al. 2003).

General doubts about the meaning of fertility preferences are most pronounced, and the relevant evidence is most sparse, in sub-Saharan Africa. Qualitative studies suggest that reproductive desires in this region may be unstable and tentative (Johnson-Hanks 2005, Agadjanian 2005), and prospective studies in Ghana and among young women in Malawi indicate a high degree of fluctuation in preferences over time (Kodzi et al. 2010a, Sennott and Yeatman 2012). In surveys in Burkina Faso, Ghana and Kenya between 25 and 40 percent of women who wanted to limit or postpone future childbearing reported that it would be no problem or a small problem if they became pregnant soon, indicating ambivalence about, or even indifference to, implementation of reproductive wishes (Speizer 2006). Whereas in other regions, declines in fertility and in unmet need track each other closely, this is not true so far in sub-Saharan Africa, leading to further uncertainty about the meaning of preference data (Casterline and El-Zeini 2014).

To our knowledge no comparison of prospective and retrospective preferences has been published from longitudinal studies in sub-Saharan Africa and only two have examined the relationship between baseline desire for children and subsequent fertility. In Nigeria, Bankole (1995) found that preferences were highly predictive of childbearing over a two year follow-up. Among couples where both husband and wife wanted another child, 54 percent gave birth, compared with 8 percent where neither wanted another, and 23-25 percent where one spouse wanted a child and the other did not. In Ghana, the monthly odds of pregnancy were 5.3 times higher among those who wanted to get pregnant within two years than for women who wanted no more children (Kodzi et al. 2010b). These results are in line with non-African studies which also show stated desire to stop childbearing to be strongly predictive of subsequent behavior.

In this paper, we use longitudinal data from rural North Malawi to augment the limited understanding of survey data on reproductive preferences in sub-Saharan Africa. Specifically we assess the stability of childbearing desires over time, compare prospective and retrospective classifications of intendedness of births and pregnancies and evaluate the predictive validity of both wife's and husband's baseline childbearing preferences.

CONTEXT

According to the latest Malawi Demographic Health Survey (DHS) the total fertility rate in 2010 was 5.7 births per woman, having fallen from 6.7 births in 1992 (National Statistical Office [Malawi] and Macro 2005). High fertility is accompanied by moderate use of contraception and a high level of unmet need. In the 2004 Malawi DHS only 28 percent of women reported using a modern method of contraception but this rose sharply to 42 percent in 2010. Despite this rise, one birth in every four was reported to be unwanted in 2010. Between 2000 and 2010 the reported ideal family size decreased from 5 to 4 children per woman, and at the time of the 2010 survey, 47 percent of married women said that they wanted no more children. Marriage is almost universal and women tend to marry relatively early and have a high incidence of divorce and remarriage (Reniers 2003).

In this analysis we use data from a Demographic Surveillance Site (DSS) established in 2002 in the south of Karonga District, northern Malawi. The DSS population numbered approximately 33,000 individuals, in an area of 135 km². The main economic activities around the DSS area, as in the rest of Karonga district, are farming, fishing and small business enterprises. Compared with other regions of Malawi, the northern region is the most rural but records the highest education and literacy indicators (Zulu 1996). Christianity is the main religion, with only around one percent Muslim. The population is rural and mainly Tumbuka speaking but the presence of other groups is not uncommon. The population is fairly static, in-migration and out-migration rates are estimated as 72 and 98 per 1000 person-years in 2008, respectively (Crampin et al. 2012).

A range of contraceptives, including injectables, pills and implants and tubal ligation, are provided by public and faith-based hospital and health centers as well as mobile outreach services in the site. Women obtain injectables and pills mainly from the hospitals or health centers (Dasgupta et al. 2013). While sterilization is extremely uncommon in sub-Saharan

Africa, it has been popularized through mobile outreach clinics in Malawi in recent years (Jacobstein 2013). As in the other areas, sterilization in Karonga is provided by Banja La Mtsogolo, which is a Marie Stopes provider.

Farming is the main source of income for 43 percent of households, with 62 percent of households growing cassava and/or maize as their two main crops. Only 2 percent of households do not grow any crops. Sixteen percent of households have access to piped water, either to their house or to a communal tap, while 60 percent obtain their drinking water from a borehole, and 24 percent from Lake Malawi, a river, or a well. Only 3 percent of households are connected to electricity.

The average household size is around 5 members per household and the total fertility rate was 5.4 children per woman in 2009. The median age at first marriage is 18, the onset of childbearing is relatively early and universal with 90 percent of all 20-24 year old women and 95 percent of currently married women having had at least one child. The community is patrilineal and the residence after marriage is usually patrilocal (Petzer 1987). This study notes that the young generation of newly married couples is increasingly likely to live with neither the husband's or wife's relatives. Polygyny is a rooted social institution in this part of Malawi; it is widespread with 15 percent of men and 27 percent of women in a polygynous relationship (Marston et al. 2009). The majority of polygynous couples (95 percent) live either in the same house or in the same compound, compared to 99 percent of monogamous couples.

HIV prevalence in adults was estimated at 2 percent in the late 1980s and 13 percent in the late 1990s. It has been fairly stable since 2000 and the most recent study in 2009/10 estimated the HIV prevalence as 9 percent in women and 7 percent in men (Floyd et al. 2012). According to a recent assessment, HIV-associated mortality has declined with the introduction of antiretroviral therapy. The proportion of total deaths attributable to AIDS declined from 42 percent to 17 percent between 2004 and 2009. The current major cause of death is non-communicable diseases (Chihana et al. 2012).

DATA AND METHODS

The Fertility Intention Study (FIS) was conducted in the ongoing DSS site of the Karonga Prevention Study. The FIS data were collected in three rounds, with an average interval of one year between rounds (Round 1: 28 October 2008 to 30 September 2009; Round 2: 1 October 2009 to 30 October 2010; Round 3: 1 November 2010 to 14 October 2011). All female and male residents in the DSS sites aged 15 to 49 were eligible. All data presented in this paper are restricted to currently married or cohabiting women.

The question on prospective and retrospective childbearing preferences of women and men were identical in meaning to those used in successive Malawi DHS and were tested using the local language during the pilot study in 2008. These questions were asked at all three rounds. The prospective measure ascertained desire for another child and preferred timing. Currently pregnant women were excluded from these questions. The retrospective measure was obtained for all women who had a birth or reported a current pregnancy during any of the three rounds and ascertained whether the child or pregnancy had been wanted at

that time, came earlier than desired or had been unwanted. In addition questions on marriage, fertility and contraceptive use were asked. The women's data are linked with men's data to create matched couple data. Men were asked questions on their fertility intention with each of their current wives if they are in a polygynous marriage.

FIS followed the re-census of the site, which includes data collection of vital events, and individual and household socioeconomic status. The study module was nested in a module on sexual behavior and HIV sero-status. Consent to FIS participation was sought separately from consent to the sexual and HIV testing in order to minimize refusal in the FIS component. This is an open cohort longitudinal study, and immigrants to the site and women who became eligible to participate were enrolled in the later rounds.

The vital events and household migration of residents living in the site are recorded and updated in the Continuous Registration System (CRS). As the individual records are linked with their mother and father's identification number, live births in our analyses were identified by linking with this registration data. Pregnancy is self-reported in the FIS questionnaire. However, it is known that there is under-reporting of pregnancy especially during the first trimester (Goldman and Westoff 1980). Thus, we classified a woman as pregnant at an interview if she gave a birth within 8 months following the interview. However, we had to rely on self-reported pregnancies and births to obtain the retrospective fertility preference measure, because, self-evidently, this information can only be asked of women who report a birth or current pregnancy.

The analyses conducted in the paper include univariate analyses for predictive validity of prospective fertility intention for 3 years from the first interview, and bivariate analysis to assess stability of fertility intention, comparability of prospective intention and retrospective fertility preference and agreement of couple's intention. We also estimated odds ratios of being pregnant or having at least one child within three-year observation period using the matched couple data and logistic regression. The husband's intention, intensity of women's intention and other demographic covariates were adjusted. All analyses were performed using Stata version 13.

RESULTS

A total of 5,618 married women participated in the fertility intention module at least once. Among these, 2635 were interviewed at each of the three rounds, 1736 were interviewed twice and 1247 once (Table 1). In round 2, 982 new women joined the study and 463 women were interviewed only in Round 3. The response rates among eligible married women were 88 percent in Round 1, 91 percent in Round 2, and 83 percent in Round3. In total 5,618 married women participated in at least once. Among women who participated in all three rounds, 96 percent stayed married across rounds. The level of participation defines eligibility for specific analyses. For instance, examination of short term stability of preferences requires participation in two consecutive rounds while stability over a two year duration requires participation in rounds 1 and 3.

<Table 1 around here>

Stability of prospective fertility intentions

A total of 3,174 non-sterilized married women provided prospective fertility intentions in consecutive rounds. Women who were seen all the 3 rounds were included twice. At the first interview, 39 percent wanted no more children, 18 percent wanted to delay childbearing for at least three years, 38 percent wanted a child within three years or were unsure about timing and a small residue of 4 percent were undecided about their preference for another child. Examination of stability of these intentions, or preferences, has to take account of changes in reproductive status. As shown in Table 2, 30 percent of the women became pregnant or gave birth between two consecutive rounds. Among women who wanted no more children in the earlier round, a majority of 65 percent gave the same response at the next round, 17 percent changed their response to wanting another child or were unsure while an equal proportion were already pregnant. Stability is more difficult to assess for women who wish to postpone childbearing than for those who wanted to stop because the passage of time will alter responses. Among the 584 women wishing to postpone the next child for at least three years, 27 percent were pregnant at the next round and 13 percent changed their response to wanting no more children. The remainder were equally divided between those who now wanted a child within three years and those who still preferred to wait at least three years. Among women who stated at the earlier round a desire to have a child within three years or were unsure about timing, one-fifth gave an inconsistent response at the next round, equally divided between those who wanted no more and those who wanted to postpone for three or more years. The majority were already pregnant or gave the same response.

<Table 2 around here>

Table 3 shows stability of prospective fertility intention between Round 1 and 3, and proportion of women who gave birth between these rounds or were pregnant at round 3. Among those who wanted no more children at round 1, 53 percent gave the same response at round 3, 13 percent wanted another child or were unsure while 35 percent were pregnant or had a child. Among women wanting another child at round 1, a majority had a birth or pregnancy. Only about five percent reported that they now wanted no more children.

<Table 3 around here>

A comparison of prospective intention and retrospective attitude

The comparison of prospective and retrospective preferences requires information on prospective fertility intention given before conception of the child and retrospective attitude collected in a subsequent round after becoming pregnant or giving birth. This comparison is possible for 1,121 married women. For the 15 women who had more than one birth or pregnancy, data for the earlier event are used. In 320 cases (29 percent) the retrospective information was collected during pregnancy rather than after the birth.

Under the prospective classification, unwanted births were defined as those occurring to women who wanted no more children. Mistimed births were defined as those occurring within 18 months to women who wished to wait for two to three years and those occurring within 30 months to those wishing to wait for three or more years. All other births or pregnancies, including those for which the woman was undecided about timing, were classified as wanted. The retrospective classification is based on the direct testimony of the women.

<Table 4 around here>

Seventy-four percent of births defined as wanted prospectively were similarly defined retrospectively. In contrast, only 14 percent classified as unwanted in the prospective measure were similarly classified retrospectively. The majority of these births or pregnancies were reported as wanted or mistimed after they had occurred. Consistency of mistimed births was intermediate, with 41 percent agreement between prospective and retrospective measures. Of the total 1,121 pregnancies or births only 47 percent were classified consistently before and after the conception of the births. While the prospective measure showed 22 percent (250/1121) of births or pregnancies to be unwanted and a further 38 percent (426/1121) to be mistimed, the corresponding estimates from the retrospective measure were 4 percent unwanted and 32 percent mistimed.

Intensity of fertility intentions

Women who were not pregnant and wanted to delay the next birth for at least one year or have no further children were asked the question, “If you have a child in the next year, will there be serious consequences? If yes, which consequence?” Table 5 shows the distributions of consequences by fertility intention.

The proportion of women who reported that a birth would have serious consequence was highest among women who wanted no more children (70 percent). A third mentioned the pregnancy would have serious consequence for their own health, and another third mentioned serious financial consequence. A majority of women who wanted to postpone the next child for three or more years also reported serious consequences (67 percent). Compared to women who wanted no more children, this group were less likely to mention financial matters but more likely to cite children’s health. Not surprisingly, women who wanted a child within two to three years or were undecided were less likely than others to report serious consequences of an early pregnancy.

<Table 5 around here>

Husband’s fertility intention

To compare husband’s and wives fertility preference, we used matched-couple data. Among 4,182 women, 2,071 women who were neither sterilized nor pregnant and provided prospective fertility intention in round 1 were matched with their husband’s data. At the

aggregate level, 39 percent of wives and 36 percent of husbands wanted no more children and 19 percent of wives and 14 percent of husbands wanted to postpone childbearing for three or more years.

At the individual level, there is a high degree of agreement in the intention of couples to stop childbearing. Among wives wanting no more children, 63 percent of husbands gave the same answer. Agreement is even higher to have a child within three years (67 percent). Postponement registers less spousal agreement. Among wives wishing to delay childbearing for at least three years, only 34 percent of husbands gave the same response, 22 percent wanted no more and 38 percent wanted a child sooner than their wife.

<Table 6 around here>

Fertility intentions and behavior

Table 7 shows contraceptive prevalence by prospective fertility intention in round 1. Current use of any method was relatively high at 44 percent but was not strongly related to childbearing intentions. Use was highest among women who wished to postpone childbearing for at least three years (48 percent), followed by 47, 38 and 33 percent among women who wanted no more children, who wanted a child within three years and were undecided about future childbearing, respectively. However, the method mix varied substantially by fertility intention. Among women who wanted no more children, 18 percent were sterilized, 12 percent were using injectable and 9 percent condoms. Women wanting to have another child reported higher levels of injectable and condom use than limiters. Traditional method use was low in all groups.

The probability of becoming pregnant or giving birth within 36 months of date of round 1 interview by fertility intention at round 1 is shown in Table 8. Women who wanted to stop childbearing altogether had a significantly lower probability of pregnancy or birth (25 percent) than other women. This figure rises to 30 percent if sterilized women are excluded. Nearly two-thirds (64 percent) of women who wanted to have a child within 3 years and 55 percent of women who wanted to wait for three or more years had a child or were pregnant.

<Table 7 and 8 around here>

To further explore the predictive power of fertility intentions on reproductive behavior over a three year time span, multivariate logistic regression was performed. As an exploratory analysis showed that the inclusion of the husband's intentions improved the fit of the model (results not shown, likelihood ratio test: p-value <0.001), the sub-sample of matched couples was used. Exploratory work also indicated that the inclusion of sterilized women made little difference to the results and these women were omitted. The co-variables in the model were woman's age, number of living children and education and marriage type. Exploratory analysis showed that addition of other covariates, such as household wealth and main source of income, made no difference to results.

Table 9 shows that both wife's and husbands fertility intentions were predictive of subsequent pregnancy or childbirth after adjustment for demographic and other factors. Compared to women who wanted no more children, the odds of reproduction for women who wanted another child within three years were 2.2 times higher and the odds for those who wanted to wait three or more years were 1.6 times higher. As indicated by the 95 percent confidence intervals, the difference between those who wanted a child soon and those who wanted to delay were not significantly different. The effect of the husband's fertility intentions was strikingly similar to that of the wife. Among other factors in the model only wife's age is significantly related to childbirth or pregnancy.

The key result of Table 9 can be expressed in terms of the predicted probabilities of having a child or becoming pregnant by whether the wife, husband, both or neither stated a desire to have more children at Round 1. When both spouses want another child, the predicted probability of a birth or pregnancy in the next three years is 0.63, holding other factors at their mean value (Table 10). When one spouse but not the other wanted no more children, the probability falls to 0.47 or 0.48 and it falls further to 0.33 when neither spouse want any more children.

Table 11 takes the analysis one further step by assessing whether a woman's education and the intensity of her preference influence her ability to implement her intention at Round 1 to have no more children. The odds of reproduction were about 30 percent lower for women who considered that an early pregnancy would have serious consequences on household finance, own or children's health than for other women but this difference is only of borderline statistical significance. Contrary to expectations, education has no significant effect. Indeed, the results suggest higher odds of pregnancy or birth among women with six to eight years of schooling than among the less educated. Women's age remains a very strong predictor; among women wanting to cease childbearing, the odds of pregnancy or birth are 80 percent lower for those aged 30 or more years than for younger women.

<Table 9, 10 and 11 around here>

DISCUSSION

The major focus of this analysis has been an assessment of prospective fertility preferences, or intentions, in terms of their temporal stability, intensity, degree of spousal agreement and their power to predict future childbearing. In similar Asian studies, the main interest has been on the binary distinction between those who want to stop childbearing altogether and those who want another child. In sub-Saharan Africa, an intermediate group, who want to postpone the next birth, is of equal interest to those who want to stop. In this region, unmet need for family planning is more likely to arise from a desire to space births rather than to limit ultimate family size, though the proportion of women who want to cease childbearing has increased in many countries (Van Lith et al. 2013, Westoff 2012). Evidence had been adduced that fertility declines in sub-Saharan Africa are being driven by postponement, expressed in terms of very long birth intervals, rather than by the Asian and Latin American

record of parity-specific cessation of childbearing (Timæus and Moultrie 2008, Moultrie et al. 2012).

Nevertheless, in this study population from rural North Malawi, family size limitation proved to be a more prevalent reported motive than postponement. Thirty nine percent of women said that they wanted no more children, a proportion close to the national estimate from the 2010 Malawi DHS, compared with 19 percent who wanted to delay the next child for three or more years. The desire to limit family size has been increasing in Malawi. For instance, in 1992 only 33 percent of women with exactly four living children wanted no more children (or were sterilized). By 2010, this proportion had grown to 63 percent.

Some indicators in this study suggested that postponement was an equally compelling motive as limitation for avoiding pregnancy. Contraceptive prevalence in the two groups was similar and an equal proportion of women stated that serious consequences would ensue if they became pregnant within a year. However, an intriguing difference between limiters and postponers in the nature of these serious consequences was apparent. Compared with limiters, postponers were much less likely to mention financial consequences but much more likely to cite threats to children's health. This difference is consistent with a large body of ethnographic evidence that the advantage of birth spacing for child health is widely appreciated in Africa.

However, agreement between husband and wife about postponement was lower than agreement over limitation and, most tellingly, the desire to have no more children was a much more powerful predictor of subsequent pregnancy or birth than the desire to postpone the next birth. Between Rounds 1 and 2, an average interval of 12 months, 27 percent of postponers became pregnant or gave birth compared with 17 percent of limiters and 45 percent of women who wanted a child within three years (Table 2). After a lapse of three years, the corresponding figures were 55 percent for postponers and 64 percent among women who had wanted a child within this period, a difference that was not statistically significant. In contrast, 24 percent of limiters had given birth or were pregnant, rising to 30 percent if sterilized women are excluded. Adjustment for woman's age and other possible influences on childbearing made little difference to estimates (Table 10). It appears that postponement is an effective spur to avoid pregnancy in the short term but less so over a three year time span. This verdict is consistent with national trends in median birth interval lengths, which have increased only modestly from 32.7 months in 1992 to 36.1 months in 2010, according to successive Malawi DHS reports.

The predictive power of baseline fertility intentions in this study is broadly in line with results from most other studies. In Morocco, 29 percent of women who wanted no more children gave birth or became pregnant within three years compared with 62 percent of those who wanted another child (Westoff and Bankole 1998). In Egypt, the corresponding figures for a two-year observation period were 25 and 59 percent and there was no difference between postponers and those who wanted a birth soon (Casterline et al. 2003). Similarly in Pakistan, 34 percent of women wanting no more children had a child or became pregnant within three years compared with 67.5 percent of women who wanted another child and again no difference was observed between postponers and those who wanted a child soon (Jain et al. 2014). Two Indian studies gave very different results. One study that covered three Indian states with a four-year follow-up found that 51 percent of non-sterilized women who wanted

no more children and 74 percent of those wanting another child gave birth (Roy et al. 2008). In the other, conducted in Uttar Pradesh, only 10 percent of non-sterilized women wanting to stop childbearing became pregnant or gave birth within two years compared with about 50 percent of those who wanted to continue childbearing (Speizer et al. 2013).

Several possible factors may account for childbearing among women who state at baseline that they want no more children, including barriers to contraceptive adoption, discontinuation of use, accidental pregnancy while using a method, intentions that are weakly held or change over time, the influence of husbands with different views about childbearing and acquisition or loss of a co-wife by husband. Clearly in this study, non-use of contraception among women who wish to cease childbearing is a major proximate cause of subsequent pregnancy or childbirth. At baseline over half (53 percent) of women wanting no more children were using no method of contraception.

Lack of intensity in the desire to stop any future pregnancy provides a partial explanation of discrepancies between intentions and behavior. Thirty percent of women who desired no more children denied that any serious consequences would result from a birth in the next 12 months, a proportion similar to those reported in other African surveys (Speizer 2006), and these women were more likely to have a child than those who affirmed that an early birth would have serious consequences. With regard to change in reproductive preferences, we were unable to determine directly its role but the evidence suggests that it may also have made an appreciable contribution. Among women stating a desire to have no more children at baseline and who were not pregnant at Round 2, 19 percent reported a desire to have another child at Round 2. A similar proportion of women shifted from wanting another child within three years at Round 1 to wanting no more at Round 2. Thus there is a fair degree of short term instability in preferences but not on a scale to undermine confidence in the meaning of responses.

One of the strengths of this study is the opportunity to assess the influence of husband's preferences on reproductive outcomes. Most studies found that husbands and wives in the aggregate had similar views on family size and agreement between individual spouses was moderately high. The recent study among young Malawian couples revealed 83 percent of couples had the same ideal family size or the difference was 1 child, and changes in desired family size among both men and women were strongly associated with partners' preference, leading to spousal convergence (Yeatman and Sennott 2014). Our finding is in line with the previous findings; 63 percent of husbands of women wanting no more children gave an identical response. Nevertheless, about one-third of matched couples disagreed about future childbearing and it was possible to compare the predictive power of husbands' and wives' intentions. The results were clear-cut: the intentions of both husband and wife matter and both are equally influential on the probability of future childbearing. The predicted proportions of having a child or becoming pregnant within a three year period rise from 33 percent when spouses agree in their desire to stop childbearing to 47 or 48 percent when one wishes to stop but not the other and further to 63 percent when both wish for more children.

An extensive literature, reviewed by Blanc (2001), has examined the influence of both spouses' preferences on contraceptive use from cross sectional surveys but very few prospective studies have collected relevant information independently from both partners. In Bangladesh, Gipson and Hindin (2009) found that the preferences of wives usually prevailed

over those of husbands in cases of disagreement. The results from this study are more similar to the findings of Bankole and Singh (1998) in Nigeria where the influence of husband and wife were equal in terms of power to predict future childbearing. Interpretation should be cautious because wives may adapt their reproductive aspirations to the perceived wishes of the husband. Nevertheless both this and Bankole's study challenge the oft repeated claim that wives are relatively powerless to implement their desire to stop having children when married to a man with different preferences.

In one of the more surprising results, the wife's education had no effect on her ability to implement her desire to stop childbearing. In view of an earlier analysis which found contraceptive use to be lower in polygynous than monogamous couples (Bascieri et al. 2013), it was also unexpected that type of marriage did not modify the relationship between reproductive intentions and subsequent childbearing. Abortion could perhaps account for the discrepancy. Though the law is restrictive in Malawi, abortion incidence is estimated to be relatively high at 23 per thousand women aged 15 to 44 years, rising to 35 per thousand in the North (Levandowski et al. 2013). A further finding of interest is that women's age but not number of living children was a strong predictor of fertility. This is consistent with the expectation that fertility transition in Africa, in contrast to Asia, will be relatively even across age groups and be less parity-specific (Caldwell et al. 1992).

Our analysis has made a significant contribution to understanding measurement unwanted childbearing. Under the prospective assessment, 22 percent of births were classified as unwanted and a further 38 percent mistimed. In contrast, only 4 percent of pregnancies or births were reported retrospectively as unwanted and 32 percent as mistimed. This contrast is consistent with other prospective studies and can only be partially attributed to changes in preferences. One puzzling feature is that the percent of births classified retrospectively as unwanted in this study was much lower than in the 2010 Malawi DHS. An explanatory analysis showed that the national average of married women who had unwanted births in the past 5 years in the 2010 Malawi DHS was 27 percent, though it was lower (18 percent) in Karonga district. Moreover, we found a high percentage of unwanted birth among married women who had only one child (15 percent). This unexpectedly high estimate calls into question their understanding of what they were being asked in the Malawi 2010. However, the large gap between the results from our study and Malawi DHS estimates in the proportion of births classified by mothers as unwanted cannot be explained by differences in the wording of the relevant question. Whatever the reason for the low estimate in this study, the contrast between prospective and retrospective estimates of unwanted childbearing supports the growing body of evidence that the former approach invariably yields higher estimates than the retrospective method. One implication is that DHS estimates of unmet need, which are derived in part from retrospective preference, are biased downwards.

CONCLUSION

The desire to limit family size has become much more common in Malawi over the past 20 years but doubts have been expressed about the interpretative weight that can be attached to such reproductive preferences in sub-Saharan Africa. The main conclusion of this enquiry is

that the correspondence between the reported desire to cease childbearing and subsequent behavior in rural North Malawi is similar to that found elsewhere, such as in Morocco, Egypt and Pakistan. In other words, the predictive validity of the stated intention to stop childbearing found in this study is consistent with those observed in other regions. By contrast, the stated desire to postpone childbearing had a relatively weak predictive power over a three year period.

The influence of the reproductive wishes of husband and wife on subsequent childbearing were symmetrical. While there was a reasonable level of spousal agreement in whether or not to have another child, about one-third of matched couples expressed differing preferences. In these dissonant cases the probability of childbearing or pregnancy was appreciably higher than when spouses concurred in the desire to limit family size.

REFERENCES

- Agadjanian, Victor. 2005. "Fraught with ambivalence: reproductive intentions and contraceptive choices in a sub-Saharan fertility transition," *Population Research and Policy Review* 24(6): 617-645.
- Bankole, Akinrinola. 1995. "Desired fertility and fertility behaviour among the Yoruba of Nigeria: a study of couple preferences and subsequent fertility," *Population Studies* 49(2): 317-328.
- Bankole, Akinrinola and Susheela Singh. 1998. "Couples' fertility and contraceptive decision-making in developing countries: hearing the man's voice," *International Family Planning Perspectives* 24(1): 15-24.
- Baschieri, Angela, John Cleland, Sian Floyd, Albert L.N. Dube, Aulive Msona, Anna Molesworth and Neil French. 2013. "Reproductive preferences and contraceptive use: A comparison of monogamous and polygamous couples in Northern Malawi," *Journal of Biosocial Science* 45(2): 145-166.
- Blanc, Ann K. 2001. "The effect of power in sexual relationships on sexual and reproductive health: an examination of the evidence," *Studies in Family Planning* 32(3): 189-213.
- Bradley, Sarah E.K., Trevor N. Croft, Joy D. Fishel and Charles F. Westoff 2012. "Revising unmet need for family planning," DHS Analytical Studies. No.25. Calverton, MD: ICF Macro
- Caldwell, John C., I.O. Orubuloye and Pat Caldwell. 1992. "Fertility decline in Africa: a new type of transition?," *Population and Development Review* 18(2): 211-242.
- Campbell, Arthur A. and William D. Mosher. 2000. "A history of the measurement of unintended pregnancies and births," *Maternal and Child Health Journal* 4(3): 163-169.
- Casterline, John B., Fatma El-Zanaty and Laila O. El-Zeini. 2003. "Unmet need and unintended fertility: longitudinal evidence from Upper Egypt," *International Family Planning Perspectives* 29(4): 158-166.

- Casterline, John B. and Laila O. El-Zeini. 2007. "The estimation of unwanted fertility," *Demography* 44(4): 729-745.
- Casterline, John B. and Laila O. El-Zeini. 2014. "Unmet need and fertility decline: a comparative perspective on prospects in sub-Saharan Africa," *Studies in Family Planning* 45(2): 227-245.
- Chihana, Menard, Sian Floyd, Anna Molesworth, Amelia C. Crampin, Basia Zaba, Andreas Jahn, Hazzie Mvula, Albert Dube, Bagrey Ngwira, Judith R. Glynn and Neil French. 2012. "Adult mortality and probable cause of death in rural northern Malawi in the era of HIV treatment," *Tropical Medicine & International Health* 17(8): e74-e83.
- Crampin, Amelia C., Albert Dube, Sebastian Mboma, Alison Price, Menard Chihana, Andreas Jahn, Angela Baschieri, Anna Molesworth, Elanaeus Mwaiyeghele, Keith Branson, Sian Floyd, Nuala McGrath, Paul E.M Fine, Neil French, Judith R. Glynn and Basia Zaba. 2012. "Profile: the Karonga Health and Demographic Surveillance System," *International Journal of Epidemiology* 41(3): 676-685.
- Dasgupta, Aisha, Albert L.N. Dube, L. Gondwe, R. Ngwalo, B. Ngwira, F. Tauro, Keith Branson, Basia Zaba and Amelia Crampin 2013. Fertility intentions and use of family planning in Northern Malawi. *XXVII IUSSP International Population Conference*. Busan, South Korea.
- Floyd, Sian, Anna Molesworth, Albert Dube, Amelia C. Crampin, Rein Houben, Menard Chihana, Alison Price, Ndoliwe Kayuni, Jacky Saul, Neil French and Judith R. Glynn. 2012. "Underestimation of HIV prevalence in surveys when some people already know their status, and ways to reduce the bias," *AIDS* 27(2): 233-242.
- Gipson, Jessica D. and Michelle .J. Hindin. 2009. "The effect of husbands' and wives' fertility preferences on the likelihood of a subsequent pregnancy, Bangladesh 1998–2003," *Population Studies* 63(2): 135-146.
- Goldman, Noreen and Charles F. Westoff. 1980. "Can fertility be estimated from current pregnancy data?," *Population Studies* 34(3): 535-550.
- Jacobstein, Roy. 2013. "Lessons from the recent rise in use of female sterilization in Malawi," *Studies in Family Planning* 44(1): 85-95.
- Jain, Anrudh K., Arshad Mahmood and Zeba Sathar. 2014. "Reducing unmet need and unwanted childbearing in Pakistan: Evidence from a panel survey," *Studies in Family Planning* 45(2): 277-299.
- Johnson-Hanks, Jennifer. 2005. "When the future decides: uncertainty and intentional action in contemporary Cameroon," *Current Anthropology* 46(3): 363-385.
- Kodzi, Ivy A., John B. Casterline and Peter Aglobitse. 2010a. "The time dynamics of individual fertility preferences among rural Ghanaian women," *Studies in Family Planning* 41(1): 45-54.
- Kodzi, Ivy A., David Johnson and John B. Casterline. 2010b. "Examining the predictive value of fertility preferences among Ghanaian women," *Demographic Research* 22(30): 965-984.
- Koenig, Michael A., Rajib Acharya and Sagari Singh. 2006. "Do current measurement approaches underestimate levels of unwanted childbearing? Evidence from rural India," *Population Studies* 60(3): 243-257.

- Levandowski, Brooke A. , Chisale Mhango, Edgar Kuchingale, Juliana Lunguzi, Hans Katengeza, Hailemichael Gebreselassie and Susheela Singh. 2013. "The incidence of induced abortion in Malawi," *International Family Planning Perspectives* 39(2): 88-96.
- Marston, Milly, E Slaymaker, I Cremin, Sian Floyd, Nuala McGrath, I Kasamba, T. Lutalo, A Nyirenda, Z Ndyanabo, Mupambireyi and Basia Zaba. 2009. "Trends in Marriage and time spent single in sub-Saharan Africa a comparative analysis of six population-based cohort studies and nine Demographic and Health Surveys," *Sex Transm Infect* 85(Suppl 1): i64-i71.
- Moultrie, Tom A., Takudzwa S. Sayi and Ian M. Timaeus. 2012. "Birth intervals, postponement and fertility decline in Africa: A new type of transition," *Population Studies* 66(3): 241-258.
- National Statistical Office [Malawi] and ORC Macro 2005. *Malawi Demographic and Health Survey*, Calverton, Maryland, NSO and ORC Macro.
- Reniers, Georges. 2003. "Divorce and remarriage in rural Malawi," *Demographic Research* S1(Article 6): 175-206.
- Roy, Tarun K., RK Sinha, Michael Koenig, Sanjay K. Mohanty and Sangram K Patel. 2008. "Consistency and predictive ability of fertility preference indicators: Longitudinal evidence from rural India," *International Family Planning Perspectives* 34(3): 138-145.
- Santelli, John, Roger Rochat, Kendra Hatfield-Timajchy, Brenda Colley Gilbert, Kathryn Curtis, Rebecca Cabral, Jennifer S. Hirsch, Laura Schieve and Other Members of the Unintended Pregnancy Working Group. 2003. "The measurement and meaning of unintended pregnancy," *Perspectives on Sexual and Reproductive Health* 35(2): 94-101.
- Sennott, Christie and Sara Yeatman. 2012. "The stability of fertility preferences and the predictors of change among young women in Malawi," *International Perspectives on Sexual and Reproductive Health* 38(1): 34-42.
- Singh, Susheela, Gilda Sedgh and Rubina Hussain. 2010. "Unintended pregnancy: worldwide levels, trends, and outcomes," *Studies in Family Planning* 41(4): 241-250.
- Speizer, Ilene S. 2006. "Using strength of fertility motivations to identify family planning program strategies," *International Family Planning Perspectives* 32(4): 185-191.
- Speizer, Ilene S., Lilsa M. Calhoun, Teresa Hoke and Ranajit Sengupta. 2013. "Measurement of unmet need for family planning: longitudinal analysis of the impact of fertility desires on subsequent childbearing behaviors among urban women from Uttar Pradesh, India," *Contraception* 88(4): 553-560.
- Timæus, Ian M. and Tom Moultrie. 2008. "On postponement and birth interval," *Population and Development Review* 34(3): 483-510.
- Van Lith, Lynn M, Melanie Yahner and Lynn Bakamjian. 2013. "Women's growing desire to limit births in sub-Saharan Africa: Meeting the challenge," *Global Health: Science and Practice* 1(1): 97-107.
- Westoff, Charles F. 2012. "Unmet Need for Modern Contraceptive Methods," DHS Analytical Studies. Calverton, Maryland, USA: ICF International

- Westoff, Charles F. 2010. "Desired number of children: 2000-2008," DHS Comparative Reports. No. 25. Calverton, Maryland, USA: ICF Macro
- Westoff, Charles F. and Akinrinola Bankole. 1998. "The time dynamics of unmet need: an example from Morocco," *International Family Planning Perspectives* 24(1): 12-24.
- Yeatman, Sara and Christie Sennott. 2014. "The relationship between partners' family-size preferences in southern Malawi," *Studies in Family Planning* 45(3): 361-377.
- Zulu, Eliya M. 1996. *Sociocultural factors affecting reproductive behaviour in Malawi*. PhD thesis, University of Pennsylvania.

Table1: Distribution of interviewed married women by round and eligibility for inclusion in specific analyses

Round 1	Round 2	Round 3	Number of married respondents	Table 2	Table 3	Table 4	Table 5-11
			446				x
			808	x		x	x
			2,635	x	x	x	x
			282		x	x	x
			338				
			646	x		x	
			463				
4171	4,427	4,026	5,618				

Table 2: Stability of prospective fertility intention between two consecutive rounds among non-sterilized married women

Fertility intention at 2nd Round							
Prospective fertility intention at 1st round	Want no more children	Unsure about having a child	Want to wait 3+ years	Want within 3 years /unsure about the timing	Had birth or became pregnant between 1st and 2nd Round	Total	Total
Want no more children	65.0	1.4	6.2	10.1	17.3	100.0	1,251
Unsure about having a child	40.0	2.3	8.5	27.7	21.5	100.0	130
Want to wait 3+ years	12.8	1.2	30.0	28.9	27.1	100.0	584
Want within 3 years/unsure about timing	10.7	1.1	10.0	33.3	45.0	100.0	1,209
Total	33.7	1.3	12.1	23.1	29.8	100.0	3,174

Note: Among 4,082 women who participated in round 1 and 2, or round 2 and 3, 300 women were sterilized, 577 women were pregnant and 22 did not provide prospective fertility intention in the first round, and 9 did not provide an intention in the subsequent round, leaving 3,174 women.

Table 3: Stability of prospective fertility intention between Round 1 and 3 among non-sterilized married women

Prospective fertility intention at Round 1	Fertility intention at Round 3					Total	Total
	Want no more children	Unsure about having a child	Want to wait 3+ years	Want within 3 years /unsure about the timing	Had a birth or became pregnant since R1		
Want no more children	52.6	1.6	3.2	7.8	34.7	100.0	924
Unsure about having a child	35.6	3.0	5.0	10.9	45.5	100.0	101
Want to wait 3+ years	4.9	1.5	11.9	15.8	63.1	100.0	428
Want within 3 years/unsure about timing	6.4	1.8	5.2	12.7	71.1	100.0	849
Total	25.9		5.6		53.9	100.0	2302

Note: Among 2920 who participated in Round 1 and 3, 196 were sterilized, 385 were pregnant and 22 did not provide prospective fertility intention in Round 1, and 15 did not provide an intention in round 3.

Table 4: A comparison of prospective intention and retrospective attitude among married women 15-49

Prospective measure	Retrospective measure				Total	N
	Wanted then	Mistimed	Unwanted	Unknown		
Wanted/wanted, but unsure about timing	74.4	20.2	1.7	3.8	100.0	425
Mistimed	56.3	40.6	0.7	2.4	100.0	426
Unwanted	46.0	37.6	13.6	2.8	100.0	250
Unsure about having a birth	50.0	40.0	5.0	5.0	100.0	20
Total	60.8	32.2	4.0	3.0	100.0	1121

Table 5: Intensity of prospective fertility intentions

Consequences	Want within 2-3 years/unsure	Want to wait 3+ years	Unsure about having a child	Want no more children	Total
Serious financial consequence	5.8	9.9	16.3	28.0	16.8
Serious consequence for own health	17.7	27.4	16.3	28.9	24.5
Serious consequence for children's health	25.6	25.4	6.7	4.5	15.5
Other serious consequence	3.1	2.7	5.9	7.3	5.0
No serious consequence	46.2	32.8	52.6	30.4	36.9
Missing	1.6	1.8	2.2	0.8	1.3
Total	100.0	100.0	100.0	100.0	100.0
N	971	601	136	1,319	3,019

Note: 281 women who wanted a child within a year were not asked this question. 293 sterilized women were excluded.

Table 6: Comparison of wife's and husband's fertility intentions

Wife's fertility intention	Husband's fertility intention					Total
	Want no more children	Unsure about having a child	Want to wait 3+ years	Want within 3 years/unsure about the timing	No intention	
Want no more children	66.6	3.2	6.3	17.9	6.2	100.0
Unsure about having a child	46.1	11.2	6.7	31.5	4.5	100.0
Want to wait 3+ years	21.7	3.9	33.5	38.5	2.4	100.0
Want within 3 years/unsure about timing	15.3	2.0	12.9	66.9	2.9	100.0
Total	39.9	3.2	13.3	39.4	4.2	100.0

Table 7: Contraceptive prevalence by fertility intention

	Want no more children	Unsure about having a child	Want to wait 3+ years	Want within 3 years/unsure about the timing	Total
Injectable	11.8	9.6	22.4	14.0	14.3
Pills	1.7	3.0	2.7	2.7	2.2
Condom	9.4	6.7	17.9	17.1	13.4
Sterilization	18.1	0	0	0	8.1
Other modern	2.8	7.4	3.7	1.6	2.7
Traditional	1.7	2.2	1.3	1.9	1.8
Not using	53.5	67.4	51.5	61.5	56.5
Missing	0.9	3.7	0.5	1.3	1.1
Total	100.0	100.0	100.0	100.0	100.0
N	1,613	135	598	1,246	3,592

Note: Among 4,171 women who participated in round 1, 579 women were either pregnant or did not provide prospective fertility intention.

Table 8: Childbirth and pregnancy by fertility intention

Prospective fertility intention	Had a child within 3 years, or became pregnant		Total	N
	No	Yes		
Want no more children	75.5	24.5	100	1,613
Want no more children (excl. sterilized women)	70.1	29.9	100	1,321
Want within 3 years/unsure	36.4	63.6	100	1,246
Want to wait 3+ years	44.7	55.4	100	598
Unsure about having a child	60.0	40.0	100	135

Table 9: Probability of childbirth or pregnancy: results from logistic regression

	Adjusted OR	95% CI		p-value	
Wife's fertility intention					
Want no more children	1.00				
Unsure about having a child	1.30	0.814	2.083		
Want to wait 3+ years	1.59	1.179	2.131	**	
Want within 3 years/unsure	2.24	1.729	2.900	***	
Husband's fertility intention					
Want no more children	1.00				
Unsure about having a child	1.72	1.024	2.883	*	
Want to wait 3+ years	1.55	1.134	2.125	**	
Want within 3 years/unsure	2.02	1.579	2.575	***	
Missing	1.26	0.754	2.100		
Wife's age					
15-29	1.00				
30-49	0.35	0.267	0.445	***	
Number of living children					
0-3 children	1.00				
3-4 children	1.07	0.840	1.358		
5+ children	1.29	0.918	1.811		
Type of marriage					
Monogamous	1.00				
Polygynous	0.99	0.778	1.249		
Wife's educational status					
None/primary 1-5 years	1.00				
Primary 6-7 years	1.27	0.943	1.723		
Primary 8yrs	1.19	0.887	1.606		
Secondary+	0.91	0.653	1.270		
N	2,063				

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

Table 10: Predicted probabilities of birth or pregnancy by wife's and husband's fertility intention

	Predicted probability	95% CI	
Prospective fertility intension			
Neither wife nor husband want another	0.33	0.283	0.370
Wife wants no more but husband wants another/undecided	0.47	0.422	0.521
Wife wants another/undecided, but husband wants no more	0.48	0.429	0.532

Both want another	0.63	0.598	0.662
N	2,063		

Note: Predicted probability were evaluated at the mean of the covariates

Table 11: Probability of childbirth or pregnancy among non-sterilised women who wanted no more children: results from logistic regression

	Adjusted OR	95% CI		p-value
Woman's intensity of intention				
No or non-specified serious consequence	1.00			
Serious consequence for finance, or own or children's health	0.72	0.514	0.998	*
Husband's fertility intention				
Want no more children	1.00			
Unsure about having a child	1.69	0.740	3.844	
Want to wait 3+ years	1.59	0.870	2.909	
Want within 3 years/unsure about timing	2.09	1.401	3.129	***
Missing	1.76	0.863	3.582	
Wife's age				
15-29	1.00	0.608	3.174	
30-49	0.21	0.141	0.321	***
Number of living children				
0-3 children	1.00			
3-4 children	0.92	0.565	1.505	
5+ children	1.29	0.752	2.196	
Type of marriage				
Monogamous	1.00			
Polygynous	1.20	0.831	1.720	
Wife's educational status				
None/primary 1-5 years	1.00			
Primary 6-7 years	1.58	0.970	2.585	
Primary 8yrs	1.47	0.906	2.374	
Secondary+	0.96	0.521	1.752	
N	796			

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