



Contraceptive method choice and spousal communication: Examining the effect of family planning method using an instrumental variable approach

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ABSTRACT

Objectives: Spousal communication is an important factor in reproductive health outcomes, including family size, contraceptive use and conflict. A purported advantage of traditional contraception is that it increases communication about family planning, since both partners need to be involved in contraceptive practice. However, there is likely to be some degree of endogeneity due to selection: couples who communicate better are more likely to select methods requiring higher degrees of communication.

Method: This paper uses an instrumental variable approach to assess the causal effect of method choice on spousal communication in 7 countries in Sub-Saharan Africa. Religion is used as an instrument since this is correlated with method but not communication.

Results: Results indicate that both traditional and modern methods are associated with greater discussion of family planning, and this is robust to the introduction of controls. However, when using the instrumental variable to account for selection effect, many of the significant results for traditional methods disappear although they persist for modern methods.

Conclusions: These findings indicate that the effect of traditional methods in improving communication is due to selection, rather than causation. While traditional methods still have a role to play in the contraceptive method mix, enthusiasm for side benefits such as family planning communication should be tempered.

Introduction

Traditional contraceptive methods- such as withdrawal, periodic abstinence or other fertility awareness methods- continue to play an important role in family planning programmes globally and are a vital component of the contraceptive method mix [1]. While historically seen as ineffective, recent developments in fertility awareness technology means that these methods are able to effectively prevent pregnancy [2–4] and information regarding their correct utilisation can be effectively disseminated via midwifery services [4] and mobile phone applications [5]. Indeed, the scientific analysis of fertility awareness based methods places them firmly within the gamut of methods in the contemporary contraceptive mix [6]. There are a number of additional benefits to these methods, since they do not require visiting a clinic which may be difficult for women in remote areas or where social context constrains service utilisation [7,8]. These methods are also particularly suitable for women who wish to space their births [9,10]. Additionally, traditional methods tend to be more acceptable to women and their male partners, with lower rates of side effects such as menstrual disruption associated with modern methods [11] which can act as

a barrier to modern method use due to infertility fears.

A purported advantage of some traditional methods of contraception or other fertility awareness based methods is that they tend to be associated with higher levels of spousal communication about family planning. For instance fertility awareness methods of contraception increase male involvement in reproductive decision making and fertility awareness [1–3]. Males become more involved through actively noting the start of a menstrual cycle to ensure correct timing of abstinence periods and in marking periods on calendars or moving beads [12]. An additional offshoot is that coital frequency tends to increase across the monthly cycle as couples become more accustomed to discussing cycles [13,14]. Males also tend to request sex more, rather than assuming consent when using fertility awareness based methods [14]. Male opposition in general appears to be low, with clinical trials of fertility awareness based methods indicating only 2% of women discontinue due to male opposition [15]. The concurrent use of fertility awareness methods- for instance with condom use- also tends to increase couple communication, due to a need to understand when alternative methods such as condoms need to be implemented during the fertile window [16].

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Spousal communication and agreement is strongly predictive of positive reproductive health outcomes. Spousal communication about family planning increases male involvement in reproductive decision making through both increased male levels of knowledge about contraception and reduction in levels of opposition to contraceptive use from male partners [17–22]. Couples with high degrees of communication about family planning tend to show lower levels of child-bearing due to a greater weighting of female reproductive desires [23] as well as lower levels of conflict regarding reproductive health outcomes [24] and covert contraceptive use [25].

This is particularly important in settings where male utilisation of both contraception and contraceptive services is low [24,26], strong patriarchal systems require male engagement to ensure contraceptive utilisation [27], or where women are economically disadvantaged [28]. Male engagement in contraceptive use is also predictive of utilisation of other reproductive health services at a later stage, such as antenatal care [29]. That said, it is highly likely that higher levels of family planning communication partially result from selection effects: couples with already high levels of communication are highly likely to self select into methods of contraception where a higher degree of spousal communication is required compared to couples with lower *a priori* communication levels about family planning. As such, it is difficult to make a causal claim regarding the role of contraceptive method choice in spousal communication, since any observed effects will be both a combination of causation and selection.

This paper aims to overcome this selection effect, and establish whether the association between traditional contraceptive use and spousal communication is causal (i.e. due to the use of the method) or selection (due to underlying levels of family planning communication within the couple). Data are drawn from 7 Demographic and Health survey countries used in previous analyses of spousal communication, which examined the correlates of spousal communication on family planning but used only standard regression techniques and so was not able to make causal claims [30]. An instrumental variable approach, using religious affiliation as an instrument, is used to eliminate the bias in standard regression approaches. The main research hypothesis is consistent with existing understanding of the effect of traditional contraceptives [2,3]:

Research Hypothesis: Use of traditional contraception will be causally associated with levels of family planning discussion

Methods

Data

Datasets in this analysis are the DHS datasets used in previous analyses of spousal family planning communication and contraceptive use. DHS are cross-sectional, nationally-representative household surveys where respondents are women of reproductive age (15–49 years). DHS used a multi-level cluster sampling survey design, where respondents were recruited via interviews provided to all eligible household members for households selected within a primary sampling unit. To ensure consistency with earlier analysis [30], this analysis uses DHS IV datasets for sub-Saharan African countries. Although more recent datasets are available, using these datasets ensures that all definitions and control variables will be consistent with the original paper. The countries selected are Benin (analytic sample size 6214), Burkina Faso (12,474), Mali (12,841), Malawi (11,688), Namibia (6,748), Uganda (7,239), and Zimbabwe (7,656). Where the sampling designs are not self weighting, sample weights are included in analysis.

The outcome measure for this analysis is whether the female partner reported communication with her spouse or partner regarding family planning within the past 12 months. The survey question is *How often did you talk to NAME about family planning in the past year?* with the available responses of (1) Never, (2) Once or twice and (3) More often.

The latter two categories were combined to create a contrast between women who reported any communication with their spouse or partner compared to those who reported no communication. This necessitates restricting the analytical sample to women who are either currently married or living with an unmarried partner.

The independent variable of interest is the contraceptive method currently in use as defined by the DHS. This variable is simplified into three major categories: non-use where a woman reports not using a method to prevent pregnancy at the time of survey; modern methods including both long term (InterUterine Device, Norplant, Injectable, Sterilisation) and short term modern methods (Pill, Condom, Diaphragm); and finally traditional methods (Withdrawal, Periodic abstinence, other fertility awareness methods). There are a number of unspecified methods in each dataset, which capture other country specific folkloric methods. In all cases these are included in the broad classification of traditional methods for the purposes of this analysis.

Analytic approach

The analytical approach in this paper uses instrumental variables to overcome the selection effects of couples into different contraceptive regimens which may bias the effect of contraceptive method on spousal communication. Instrumental variable models recognise that the relationships observed in cross sectional data may be unsuitable for making causal claims, due to confounding. While observed confounding variables can be controlled for by using standard regression techniques, the presence of lurking variables is a concern and can lead to a non random allocation in the predictor variable. Even if all confounders are controlled for, correlation between the predictor variable and the residual term (endogeneity) can lead to biased coefficient estimation. Selection effects through lurking variables are one source of such endogeneity. Instrumental variables overcome this limitation provided that they fulfil two major criteria: they are (1) correlated with the independent variable of interest (contraceptive method) but (2) uncorrelated with the outcome variable (spousal communication)- this is the exclusion restriction [31]. Including this instrument allows estimation of the causal effect of the independent variable of interest unbiased by any endogeneity that may exist between the outcome and predictor- in this case invoked by selection effects. The instrumental variable in this case is religious affiliation: religion is strongly associated with the range of contraceptive methods available to women due to restrictions on the permitted methods [32,33,34]. The association between is verified empirically in the current data, with a significant association based on a Chi-Square test ($\chi^2 = 609.35$ on 5 d.f., $p = 0.00$ for the pooled dataset). Religious affiliation is measured using the following categorisation: Christian (Protestant), Christian (Catholic), Muslim, Traditional/local religion, Other Christian, None. There is no good reason to believe however that religious affiliation will be associated with spousal communication (over and above included control variables, in particular tribal affiliation). As such, instrumenting on religious affiliation should allow us to estimate something closer to a causal effect of contraceptive method choice on spousal Family Planning (FP) communication. However, it does preclude the expansion of our analysis to other outcomes in previous studies [30] such as approval of contraceptive methods for controlling fertility since these are highly likely to be correlated with religious affiliation, thus failing the exclusion criterion.

Models are estimated for each country in turn, using the following modelling strategy. Model I establishes whether there is any association between the probability of FP communication and the current contraceptive method in use. Model II expands on this, including a range of relevant control variables associated with spousal FP communication [30] namely residence, female education, spousal education, difference in spousal educational levels, female age, large spousal age difference, working for cash, polygynous marriage, fecund status and wealth quintile. Tribal association is included as an additional control to

Table 1
Sample sizes and key background variables for each country in the analytic dataset.

Variable	Country						
	Benin	Burkina Faso	Malawi	Mali	Namibia	Uganda	Zimbabwe
N	6214	12,474	11,688	12,841	6748	7239	7656
<i>Has discussed family planning in the past year (Outcome variable)</i>							
No (%)	87.3	91.9	90.6	94.0	88.3	78.1	86.2
Yes (%)	12.7	8.1	9.4	6.0	11.7	21.9	13.7
<i>Contraceptive method type (Explanatory variable)</i>							
None (%)	82.1	84.7	74.5	91.6	58.3	76.8	69.9
Traditional (%)	10.9	4.6	3.4	1.4	0.7	3.6	8.0
Modern (%)	6.9	10.6	21.9	6.8	40.9	19.5	22.1
<i>Religious affiliation (Instrument)</i>							
Christian (Protestant) (%)	3.2	5.4	8.5	0.0	73.4	41.0	75.2
Christian (Catholic) (%)	31.0	24.5	39.6	0.0	23.6	39.2	22.9
Muslim (%)	21.7	55.8	15.5	92.7	0.0	14.0	0.2
Traditional/Local (%)	18.2	12.0	0.0	3.6	0.0	0.0	0.0
Other Christian (%)	17.5	0.0	35.1	2.6	0.0	0.0	0.0
None (%)	8.1	2.6	1.0	0.9	2.8	5.7	1.6
Control variables							
<i>Residence</i>							
Urban (%)	38.3	24.3	14.1	27.2	45.8	33.5	36.6
Rural (%)	61.6	75.6	85.9	72.7	54.1	66.4	63.3
χ^2	11.75, p = 0.00	52.92, p = 0.00	0.32, p = 0.566	40.84, p = 0.00	39.39, p = 0.00	6.96, p = 0.01	5.22, p = 0.02
<i>Education</i>							
No education (%)	64.8	79.2	70.0	23.3	11.7	20.1	11.6
Primary (%)	21.7	11.8	18.2	62.2	32.1	56.3	57.5
Secondary or higher (%)	13.4	8.8	11.7	14.4	56.0	23.5	19.4
χ^2	0.38, p = 0.82	49.33, p = 0.00	8.02, p = 0.02	70.44, p = 0.00	8.73, p = 0.01	52.03, p = 0.00	4.03, p = 0.13
<i>Difference in spousal education</i>							
Same (%)	44.4	66.3	49.1	66.0	28.9	41.1	39.2
Wife higher (%)	5.2	5.0	6.9	6.5	8.5	6.1	5.8
Husband higher (%)	50.2	28.6	43.8	27.4	62.5	52.7	54.8
χ^2	14.76, p = 0.00	73.64, p = 0.00	25.23, p = 0.00	12.56, p = 0.00	18.00, p = 0.00	101.43, p = 0.00	21.16, p = 0.00
<i>Age</i>							
Under 30 (%)	71.7	68.8	75.7	70.5	72.0	75.7	72.5
Over 30 (%)	28.3	31.2	24.3	29.5	28.0	24.3	27.5
χ^2	2.71, p = 0.22	12.63, p = 0.00	99.71, p = 0.00	184.77, p = 0.00	219.55, p = 0.00	181.83, 0.00	149.27, p = 0.00
<i>Age difference between spouses</i>							
Less than 5 years (%)	16.1	12.2	19.4	10.6	15.8	17.8	12.8
More than 5 years (%)	83.9	87.7	80.5	89.3	84.1	82.1	87.1
χ^2	5.23, p = 0.02	12.63, p = 0.00	15.10, p = 0.00	12.56, p = 0.00	96.68, p = 0.00	53.35, p = 0.00	57.01, p = 0.00
<i>Does the woman work for cash?</i>							
No (%)	25.2	74.9	82.2	54.8	65.7	49.5	66.5
Yes (%)	74.8	25.0	17.8	45.2	34.2	50.5	33.4
χ^2	58.44, p = 0.00	43.13, p = 0.00	0.96, p = 0.32	3.56, p = 0.06	37.62, p = 0.00	48.84, p = 0.00	13.07, p = 0.00
<i>Is the marriage polygynous?</i>							
No (%)	54.1	50.7	83.8	56.8	87.7	70.3	82.9
Yes (%)	45.8	49.3	16.2	43.1	12.3	29.7	17.1
χ^2	18.98, 0.00	50.99, p = 0.00	6.97, p = 0.00	58.26, p = 0.00	5.81, p = 0.02	37.09, p = 0.00	5.11, p = 0.02
<i>Is the woman infecund?</i>							
No (%)	87.7	82.7	89.3	83.1	90.8	87.4	84.9
Yes (%)	12.3	17.3	10.7	16.9	9.2	12.6	15.1
χ^2	78.50, p = 0.00	88.43, p = 0.00	68.56, p = 0.00	2.45, p = 0.11	4.99, p = 0.03	190.6, p = 0.00	102.20, p = 0.00
N	6141	12,211	11,542	12,812	6749	7085	5996

Note: Chi square and p-values refer to bivariate test of association with outcome variable for all controls.

eliminate any cultural effects beyond pure religious affiliation. The distribution of these control variables is presented in Table 1. This model tests whether the associations in Model I are robust to controls, but will still produce biased estimates of the effect of contraceptive method where there are selection effects for the type of contraceptive. Model III therefore includes the instrumental effect of religion as well as controls: this allows assessment of whether the effect of contraceptive method choice is indeed causal or due selection effects. All of these models are presented in a separate Table (Table 2).

Models presented are on all occasions multivariate probit models, and as such two equations are estimated for the effect of traditional and modern methods (non-use is omitted as the reference category to identify the model). Probit coefficients estimate the change in the probability of spousal communication relative to the omitted category (non-use). All coefficients presented are probit coefficients, and positive coefficients are interpreted as increasing the probability of spousal communication, while negative coefficients decrease the probability of spousal communication. All analyses are conducted using Stata 13.0 for

Table 2

Estimated probit coefficients for effect of traditional and modern contraceptive use on probability of having spoken to spouse about family planning in the past year.

	Model I		Model II		Model III							
	Traditional methods	Modern methods	Traditional methods	Modern methods	Traditional methods	Modern methods						
Benin	0.87	**	0.97	**	0.65	**	0.94	**	0.51	**	0.89	**
Burkina Faso	0.41	**	0.78	**	0.27	**	0.67	**	-0.06		0.75	**
Malawi	0.63	**	0.54	**	0.31	**	0.31	**	0.24		0.35	**
Mali	0.50	**	0.81	**	0.37	*	0.61	**	0.04		0.88	**
Namibia	0.26		0.34	**	0.06		0.07		-0.03		0.07	
Uganda	0.77	**	0.75	**	0.47	**	0.51	**	0.48		0.48	**
Zimbabwe	0.65	**	0.89	**	0.14		0.29	**	-0.05		0.42	*

Notes: Control variables are residence, female education, spousal education, difference in spousal educational levels, female age, large spousal age difference, working for cash, polygynous marriage, fecund status, wealth quintile and tribal affiliation.

Reference category in all cases is non-use.

** Denotes $p < 0.01$.

* Denotes $p < 0.05$.

Windows.

Results

Table 2 presents results from the model building process.

In model I, the effect of traditional method use on the probability of spousal FP communication is generally positive and significant. Positive coefficients in Benin, Burkina Faso, Malawi, Mali, Uganda and Zimbabwe indicate that the use of a traditional method (compared to non-use) is associated with a higher probability of spousal FP communication within the last year which are all significant at the 1% level. This is also true for modern methods, where the use of a modern method is associated with an increased probability of spousal FP communication about family planning in all countries, significant at the 5% and 1% levels.

Model II introduces control variables for residence, female education, spousal education, difference in spousal educational levels, female age, large spousal age difference, working for cash, polygynous marriage, fecund status, wealth quintile and tribal affiliation. The effect of traditional contraceptive use attenuates after the introduction of controls, with the coefficient for Mali weakening to significance at the 5% level only and falling in magnitude from 0.50 to 0.37, and the loss of significance for the coefficient in Zimbabwe altogether (effect sizes falling from 0.65 to 0.14). There are still positive coefficients at the 1% level in the majority of cases, with the use of traditional methods expected to increase the probability of spousal FP communication in Benin (0.65), Burkina Faso (0.27), Malawi (0.31) and Uganda (0.47). Similarly, when considering the effect of modern method use, there is a somewhat persistent and positive effect of contraceptive method use, with only Namibia losing significance and the coefficient falling from 0.34 to 0.07.

Model III includes both the control variables and also the instrumental variable of religious affiliation. There is a dramatic effect of the introduction of the instrument on the effect of traditional method use, with Burkina Faso, Mali and Zimbabwe having no significant effect, and in Malawi and Uganda there is an effect significant only at the 5% level. Benin is the only country in Model III where there is a strong and significant effect of traditional method use on spousal FP communication. In contrast, there is a relatively muted effect on the introduction of the instrument on the effect of modern contraception. The majority of coefficients are still significant at the 1% level (Benin, Burkina Faso, Malawi, Mali, Uganda), and while the effect size decreases, there is still a significant effect at the 5% level in Zimbabwe.

Discussion

This analysis uses an instrumental variable approach to identify whether effects of traditional method use on spousal communication

about family planning are causal or due to selection. Using DHS surveys from 7 countries in sub Saharan Africa, the analysis finds that although traditional contraception is positively associated with spousal FP communication and this is robust to controls, this effect largely disappears when an instrumental variable is used: the only strongly significant effect remaining is in Benin. In contrast, modern method use remains consistently associated with spousal FP communication even in the presence of an instrument.

This analysis demonstrates that while modern methods seem to have a causal effect on spousal family planning communication, the purported benefits of traditional contraceptive methods in terms of improving spousal FP communication are largely attributable to selection. This refutes the main research hypothesis, which was that there was an effect of traditional method use on spousal communication as claimed in other literature [1–3,12–13]. This is indicative that the predicted higher probabilities is likely due to either background characteristics or due to some sort of characteristic about these methods themselves: it is highly plausible that couples with higher levels of underlying FP communication will select methods with this in consideration.

One unanticipated result is the persistently significant effect of modern contraceptive methods in increasing the level of spousal FP communication, which is robust to the introduction of both controls and the instrument. This result is especially puzzling, since many of the modern methods require none of the interaction between couples in terms of active and continuous discussion- indeed many of these methods can be used covertly [21]. That said, improved couple communication is persistently associated with modern method use- this extends to covert use, which tends to decrease as overall contraceptive method use increases and women no longer need to hide contraceptive practise [35]. Negotiation is strongly associated with increased use of modern methods while male refusal is associated with a decline in overall usage and a shift in method mix toward traditional methods [36]. This is associated with broader trends in female empowerment, in general. Higher levels of women's decision making tends to increase the level of modern method usage as women access health services more generally and are then directed to reproductive services [37].

Some mechanistic methods such as condoms may improve spousal communication in this manner consistent with those claimed for fertility awareness methods [12], and further research on a method by method analysis could focus on this. That said, the effect of female empowerment as a tentative hypothesis is consistent with the finding of this paper: 'couple' modern methods including condom, female condom, diaphragm, etc. have an increased probability of use associated with increased communication levels at least as great, and in some settings greater, than 'female only' methods [36]. Another interesting result is the persistently significant coefficient for traditional method use in Benin, which is robust to the introduction of both

controls and the instrumental variable. While the significance of the coefficient is unusual, it should be noted that the magnitude of the coefficient is consistent with expectations: there is a decline in effect size both introducing controls and then also introducing the instrument. This indicates that at least some of the effect in Benin is due to the sort of selection effects evident in the rest of the analytic sample.

Limitations

This paper makes a major methodological advance over previous analyses in identifying causal effects of method use on spousal communication about family planning. However there are some limitations worth mentioning. Due to sample size, this analysis made use of relatively broad classifications of method type (traditional and modern) and is therefore unable to disentangle effects that may pertain to specific methods. The method mix of the countries included in the analysis showed considerable cross national variation when broken down to specific methods, thus rendering any cross national analysis impossible. The relatively broad grouping of contraceptive method and as such it is impossible to draw more nuanced findings given the wide range of methods within this category. This is particularly problematic with fertility awareness methods, where methods such as standard days and rhythm are comparable in functional mechanism but classified differently. Additionally, while the use of an instrumental variable in this context allows causal inferences to be made where not otherwise possible, it should be noted that the instrument in this case is only weakly associated with the treatment variable with polychoric correlations of -0.12 and Kruskal's gamma of -0.17 . That said, as already noted this association is still significant ($\chi^2=609.35$ on 5 degrees of freedom). The usual criticisms of instrumental variable approaches also hold in this circumstance: it is difficult to generalise beyond our analytic sample without testing the validity of the instrument in other settings. It is also worth noting that the utilisation of traditional methods is highly likely to be underreported as has been found from qualitative work in African settings [38]. Further, DHS record only the most effective contraceptive method in the current use status. This means that where women are using two methods concurrently- for instance using condoms only during the fertile window [16]- the less effective method will be missed.

Conclusions

While traditional contraception still has a part to play in reducing the risk of unwanted pregnancy particularly given the increasingly scientific approach and improved effectiveness [2–4], the claim that traditional contraceptives themselves will result in higher levels of couple FP communication and the benefits associated with this seems largely due to the selection of better communicating couples to using these methods. As such, recommending continued reliance on traditional methods should focus on the key advantages of reducing accidental pregnancy in lieu of other options rather than more tenuous side benefits.

Author contributions

MA was responsible for the conceptualisation, design, analysis and write up of the study.

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Declaration of Competing Interest

None.

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