Meeting 'Actual Demand' for Contraceptives in Ghana: Does Women's Autonomy Matter?

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Abstract

We address a basic conceptual gap in research on the relationship between women's autonomy and contraceptive behaviour. To ascertain the influence of autonomy on meeting contraceptive demand, we define women's actual demand for contraceptives considering their intentions, using data from the 2008 Ghana Demographic and Health Survey. Our sample included non-pregnant married/cohabiting fecund women aged 15-49 who had knowledge and intention for contraceptive use but not desiring conception within two years. We investigated the influence of household decision-making and household economic autonomy on current contraceptive use, controlling for sexual activity and socio-demographic characteristics. About half the women studied had an unmet demand. Controlling for all other characteristics, two binary logistic regression models revealed that neither measure of autonomy is statistically associated with meeting women's actual demand for contraceptives (α=.05). However, formal education, age, wealth and region of residence significantly predict contraceptive use. Autonomy does not predict met demand for contraceptives.

Introduction

The 1994 International Conference on Population and Development (ICPD) contributed to a discursive shift from population control and economic development to human rights. It emphasised sexual and reproductive health and the integration of individual needs of men and women in the development agenda. Thus, focus on women's control of their reproductive health remains a successful outcome of the Cairo population conference. Subsequently, the Millennium Development Goal (MDG) three aims to promote gender equality and empower women while MDG five targets improving maternal health by achieving universal access to reproductive health services by 2015.

Power imbalance in intimate relationships across cultures influences sexual and reproductive behaviours of women. Women's inability to control reproductive behaviour, regarding reproductive decision-making as men's domain, inhibits their ability to regulate fertility (Caldwell & Caldwell, 1987; Dodoo & Landewijk, 1996; Dodoo, 1993). Autonomy accords women control over their reproductive health behaviours whereas lack of power inhibits their decision-making regarding family planning (Blanc, 2001; Do & Kurimoto, 2012). It is thus important to investigate the extent to which autonomy affects women's sexual and reproductive health (Crissman et al., 2012).

Available studies on the link between women's relative power in relationships and contraceptive behaviour have been largely inconclusive (Al Riyami et al., 2004; Crissman et al., 2012; Do & Kurimoto, 2012; Saleem & Pasha, 2008) for two main reasons. First, measures of women's power indicators are diverse and arbitrary. Secondly, measurement of contraceptive use varies and has failed to account for actual demand for contraceptives. Several studies have explored the relationship between autonomy and unmet need for contraceptives (Al Riyami et al., 2004; Bloom et al., 2001; Crissman et al., 2012; Do & Kurimoto, 2012; Jejeebhoy & Sathar, 2001; Odutolu et al., 2003; Rahman et al., 2014; Saleem & Pasha, 2008), but we do not find any that considers women's knowledge, intentions and sexual activity. To

understand the influence of power within relationships on contraceptive use, it is necessary to demonstrate that, barring all known determinants (especially knowledge, intention for use and sexual activity); women desire to use contraceptives but are inhibited by their lack of power. Do & Kurimoto (2012) emphasise the need to establish demand for family planning before assessing the association with autonomy.

There is a paucity of research to examine the extent to which women's autonomy or lack of it predicts meeting demand for contraception. This study attempts to fill this research gap by examining the role of women's autonomy in meeting demand for contraception, controlling for sexual activity, contraceptive knowledge and intention and women's susceptibility to pregnancy. The paper presents a cross-sectional analysis of the association between two dimensions of autonomy and contraceptive use among women with a stated intention for use.

Unmet need versus demand

Since its origins in the 1960s as the Knowledge, Attitude and Practice (KAP) gap, the concept and rationale of unmet need have evolved together with the family planning movement. The concept of unmet need has been used by researchers and policymakers to define the discrepancy between women's fertility intentions and their actual contraceptive use. The concept which is central to population and reproductive health fields has attained an unprecedented level of priority in family planning (Bradley et al., 2012; Sedgh et al, 2007) as a reproductive health indicator of MDG five (Bradley & Casterline, 2014). A misconception and consequent misuse of the concept of unmet need is that it accounts for the unsatisfied demand by women for contraception (Bradley & Casterline, 2014; Callahan & Becker, 2014; Cleland et al., 2014; Ross & Winfrey, 2001; Roy et al., 2003; Mills et al., 2010). Contraceptive non-use among women who do not desire children includes women who are not exposed to the risk of pregnancy. There is also non-use by women who have no desire for contraception.

The concept of "demand" denotes willingness and ability on the part of women in need of contraception. Research has shown that women with unreceptive attitudes towards contraceptives are less likely to adopt a method compared with those who have an intention for use (Callahan & Becker, 2014; Machiyama & Cleland, 2014). Also, it is conceivable that even with increased access, a considerable proportion of women with an unmet need would not use contraceptives due to knowledge and attitudinal barriers or a lack of willingness (Callahan & Becker, 2014; Lesthaeghe & Vanderhoeft, 2001; Malarcher & Polis, 2014; Ortayli & Malarcher, 2010).

It is evidently becoming necessary for micro level measurement of unmet need to include women's intention for use. Desire and accessibility seem to be preconditions for contraceptive use. Bankole & Westoff (1998) identify a strong association between intention and women's subsequent behaviour and that reproductive preferences are validly measured by reproductive intentions. Based on this, we assume that women who currently use or state an intention for future use have a favourable attitude toward contraception. This is a plausible assumption corroborated by Machiyama & Cleland (2014) that women at risk of unintended pregnancies yet who have no intention for future use are attitudinally resistant to contraception.

Also, recent works by Callahan & Becker (2014); Cleland et al. (2014); Machiyama & Cleland (2014) have acknowledged the need to take into account women's intentions in combination with unmet need to measure "actual contraceptive demand". Thus, "unmet demand" for contraceptives is an emergent theme and seems a robust indicator for determining contraceptive use among women. Bradley & Casterline (2014) underscore the essence of unmet need as an aggregate-level measure for purposes of comparison but not as an individual-level estimate. They stress the importance of taking into account women's behavioural and physiological capacity for conception including intention or desire should it be necessary to estimate individual-level need for contraception. We further propose that individual-level estimates should thus consider 'demand' in assessing the discrepancy between fertility

preference and contraceptive behaviour with a focus on knowledge, access and desire. Given that family planning should focus on satisfying women's reproductive health needs and rights, their personal desires for fertility regulation and contraception must be paramount.

Women who are currently using contraceptives have a met demand whereas those who have an unmet need, though they intend to use contraceptives, can be said to have an unmet demand. The implications for women with an unmet demand differ from those for their counterparts who have no intention for use. Improving access, for instance, may suffice for the former whereas intensive information or education and communication targeted at attitudinal change or some operational intervention may be necessary for the latter (Malarcher & Polis, 2014; Mills et al., 2010).

Women's autonomy and contraceptive behaviour

Autonomy, empowerment and status have been invariably used to refer to women's ability to exert control over their personal lives. In most cases, though they have been defined differently, dimensions of autonomy and empowerment have been measured with similar sets of questions by different studies (Al Riyami et al., 2004; Do & Kurimoto, 2012; Hou & Ma, 2013; Rahman et al., 2014; Saleem & Pasha, 2008; Saleem & Bobak, 2005; Woldemicael, 2009).

Among the factors contributing to high unmet need for contraceptives and low uptake of family planning services among women in sub-Saharan Africa (SSA) is the lack of decision-making power (Do & Kurimoto, 2012; WHO, 2010; Blanc, 2001). For example, Ghana is dominated by traditional social systems which subordinate women to men in contexts that deprive women of control (Dodoo & Landewijk, 1996; Dodoo, 1993). Thus, ensuring that women are empowered has the potential to positively influence attainment of fertility intentions as well as affect their general sexual and reproductive health (Crissman et al., 2012; Kamiya, 2011). However, Ahmed et al. (2010) identify that this association between women's power and maternal health is weak in SSA unlike in other developing contexts. In Ghana for

instance, where health reasons or perceived side effects constitute a major reason for lack of intention for future use (Machiyama & Cleland, 2014; Sedgh et al., 2007), it may be difficult to estimate the effect of their lack of autonomy on women's contraceptive behaviour. Rather, than a lack of decision making power, contraceptive non-use may be due to resistance to use. The effect of women's autonomy on their contraceptive behaviour can thus be fully measured if their attitude towards contraceptive use is considered.

Whereas studies have shown that women's autonomy in sexual relationships mediates the relationship between their socioeconomic and demographic characteristics and contraceptive use (Do & Kurimoto, 2012b; Hou & Ma, 2013; Jejeebhoy & Sathar, 2001; Rahman et al., 2014; Saleem & Bobak, 2005; Woldemicael, 2009) others have indicated that autonomy is no significant factor of contraceptive use (DeRose, Dodoo, & Patil, 2002; Mumtaz & Salway, 2005). To what extent women's autonomy and which aspects of it influence their contraceptive behaviour in developing contexts with low contraceptive prevalence is largely unanswered. We thus seek to determine the extent to which women's autonomy in marriage or cohabiting relationships influences satisfying their contraceptive demand.

Methods

Data

The study draws data from the 2008 Ghana Demographic and Health Survey (GDHS), the fifth in the series of demographic and health surveys that have been carried out in Ghana every five years since 1988. The survey collected information from men and women in the reproductive ages on their reproductive health behaviours, socioeconomic and demographic characteristics, child healthcare practices, domestic violence and household characteristics among others. Detailed information about the survey methodology is available in the GDHS report (GSS,

GHS, & IM, 2009). This study uses information solely from the women's dataset, which provides the required data on women and their reproductive health behaviour.

Sample Design and Selection

The women's data file utilised in this study originally contains 4,916 females in their reproductive ages. The data were filtered to obtain 2,950 women who were either married or cohabiting. This was done for two main reasons. First, single women do not have similar contraceptive use profiles as married or in-union women (Crissman et al., 2012; Machiyama & Cleland, 2014), and second, they cannot be assessed for autonomy in relationships based on the DHS data. All women who had no need for contraceptives at the time of the survey were excluded from the sample. These included women who had never had sex, who had been declared infecund and women who desired pregnancy within two years of the survey. Pregnant women were also excluded from the sample. These women tend to be included in unmet need measures based on their responses to questions about desire for their current pregnancies. However, as Graham et al. (2003) point out from their studies involving retrospective recall of sexual behaviour, such responses may be unreliable due to recall bias experiences. Also, women's autonomy at conception is not measured by the survey. Thus, the effect of their autonomy on their recalled met or unmet demand cannot be ascertained. Women without any knowledge or intention to ever use contraceptives were eliminated because for such a group contraceptive non-use may not be due to the power dynamics within their relationships. In computing the autonomy variables and recoding other variables, missing cases were generated and these were excluded from the sample, leaving 1,086 women for analysis.

Measurement of Variables

Women's Autonomy

Two composite indices were created to measure women's autonomy: household decision-making autonomy and household economic autonomy. Economic autonomy was assessed

using two questions on who had the final say about how either partner's income would be used. Decision-making autonomy was assessed by five questions about decisions regarding woman's healthcare, daily purchases for household use, large household purchases, visits to relatives or friends and number of children to have. Scores were assigned based on the decision-maker for the activity. A score of 2 was allocated for woman alone as decision-maker, 1 for joint decision-making by husband and wife and 0 for husband alone or other person. Principal component analysis was conducted to validate the indices of autonomy and their components. A Kaiser-Meyer-Olkin (KMO) score of 1 represents a perfect aggregate of variables. The analysis yielded a KMO score of 0.718, based on which the two autonomy indices were generated. Both autonomy indicators were measured as continuous variables with values ranging from 0 to 10 for decision-making autonomy and 0 to 4 for economic autonomy.

Sexual Activity

The sexual activity variable is measured as consisting of three categories, sexually active, sexually inactive-postpartum and sexually inactive-not postpartum. Sexually active women are those who had sexual intercourse within the four weeks prior to the survey. Those who did not have sexual intercourse within that period were classified as being sexually inactive. This group was further divided into those who had recently given birth and those who had not.

Other Control variables

The variables identified and assessed as possible cofounders for contraceptive use include the respondent's age, educational attainment, type of place of residence, region of residence, number of living children, employment status, wealth index and ethnicity. Educational attainment measured the highest level of formal education a respondent had attained. This was categorised as None, Primary, Middle/Junior High School (JHS) and Secondary or Higher. Employment status was based on a respondent's reported status as employed or not and

whether there was payment or not if employed. Categorisations of age, number of living children, urban/rural residence, region of residence and wealth index were based on original categorisations by the 2008 Ghana DHS. Ethnicity was recoded on the bases of cultural similarity, geographical locations and number as Akan, Ewe/Ga-Dangme, Mole-Dagbani/Grussi/Gruma/Mande and Other. Religion was categorised as Moslem, Catholic, Other Christians, No religion and Traditionalist/Spiritualist/Other.

Dependent variable

Met demand was measured by current use of any contraceptive method. Any contraceptive method included all modern and traditional methods – condoms, the pill, IUD, implants, injectables, sterilisation, lactational amenorrhoea method, emergency contraceptive pills, rhythm and withdrawal methods. In this study, a married woman was defined as having an unmet demand if she was fecund, not pregnant or amenorrheic and did not want any more children but was not currently using any method of contraception. Underlying the measurement is the assumption that all non-users who stated an intention for later use had a favourable attitude toward contraception and thus constitute demand for contraceptives. All users of were described as having a met demand.

Analyses

We conducted much of the analyses using IBM SPSS statistical analysis software. We conducted univariate analyses to assess the autonomy, contraceptive use and background characteristics of the 1,086 pregnancy-susceptible in-union women. To test the correlations between met demand and the independent variables we ran Pearson chi-square tests for the categorical variables. For the continuous variables (age, number of living children and autonomy), we assessed bivariate correlations with met demand. We also conducted linear regression models to assess their associations with proportions of met demand and displayed

these in graphs using Microsoft Excel. Finally, binary logistic regression models were used to estimate the odds ratios of met demand. We ran two models, the first incorporated women's autonomy and their socio-demographic and economic characteristics, while the second also included their sexual activity status.

Results

Univariate and Bivariate Analyses

Table 1 shows percent distributions of the respondents by their responses to questions based on which autonomy is calculated.

<<Table 1 about here>>

Generally, women have the least say in making decisions about major household purchases (42.0%) and use of their spouses' incomes (57.1%). Nonetheless, about 45 percent are solely responsible for decisions related to daily household purchases and 48.6 percent for use of their own incomes. Particularly, they are jointly responsible for decisions on visits and the number of children to have.

Table 2 displays the percent distributions of respondents by selected characteristics measured as categorical variables and the mean distributions of the continuous variables. The mean composite score of household decision-making autonomy is 4.94 from a range of 0-10 while the mean household economic is 1.74 out of a possible high score of 4. Exactly one-half of Ghanaian women have a met demand for contraceptives at the time of the survey – about 37% were using a modern method, and 13% a traditional or folkloric method.

<<Table 2 about here>>

The average age of women in the study is 32.2 years but the minimum age in this sample is 16 years (not shown). The average number of living children women have is 3.4 with the nulliparous just below 3% of the sample (not shown). As shown in Table 2, about two-thirds of the respondents have some education; about nine percent have attained secondary or higher levels of education. The majority (63%) of respondents are rural residents. About 70 percent of the women are distributed among various Christian denominations while Moslems make up about fifteen percent and the other religions or 'no religion' category together make up the remaining proportion. Whereas a minority (6.6%) of women are unemployed about 9 percent are employed without pay. Although majority of respondents are sexually active, a substantial proportion is inactive (40%), of whom a large number is not postpartum.

Table 2 also presents significantly associated patterns of met demand among respondents by selected socio-demographic characteristics, particularly the categorical variables. While met demand is highest among respondents with middle level of education it is lowest among women with no education. Met demand is higher among urban compared to rural residents. Unmet demand is lowest in the Greater Accra and Ashanti Regions, the two wealthiest regions in the country. The Northern and Upper East Regions which are among the poorest regions have the lowest proportions of met demand for contraceptives. The high proportion of met demand among the Ewe/Ga-Dangme ethnic groups, contrary to the high unmet demand among the Mole-Dagbani/Grussi/Gruma/Mande could be explained by the concentration of these ethnic groups in the different regions of Ghana. Met demand is significantly low among traditionalist/spiritualist/other religions and Moslem women. Met demand increases with increasing levels of wealth. Women in unpaid employment have the highest unmet demand (63%). Obviously, women who are sexually active have the highest met demand, assuming that sexually inactive women have a demand for contraception too. However, there is a substantial proportion of met demand (contraceptive use) among women

who are not postpartum but are sexually inactive. A large proportion (57%) of women who otherwise would have an unmet demand are not sexually active (not shown in table).

The relationships between met demand and the continuous variables are assessed using linear regression models. Figure 1 shows the relationships between met demand for contraceptives and women's age, number of living children and both dimensions of autonomy. While met demand is significantly related to and grows with increasing age, decision-making and economic autonomy, the inverse relationship exists for number of living children, but this relationship is not significant.

<<Figure 1 about here>>

Multivariate Analyses

Results of multivariate logistic regression models to assess the effect of autonomy, abstinence and other socio-economic variables are presented below. Table 3 displays results from Model 1 which includes autonomy indices and background characteristics as predictors while Model 2 in Table 4 includes sexual activity in addition to these variables.

<<Table 3 about here>>

In Model 1, we include the two dimensions of autonomy and the socio-economic characteristics of women, but not sexual activity. The results show that household decision-making autonomy is not associated with women's contraceptive use. Similarly, women's household economic autonomy is not associated with contraceptive use. In this model, the odds of met demand for contraceptive use increases with a woman's age; thus, older women are more likely to have a met demand than their younger counterparts. A one-point increase in a woman's age is associated with a six percent increase in the likelihood that a woman had met demand for contraceptives than an unmet demand.

The odds of met demand were greater for all other wealth quintiles compared with women in the poorest quintile. The richest women had over four times the odds of meeting their contraceptive demand compared to the poorest women. Residence significantly influences met demand. Compared with urban women, rural women had greater odds (1.6) of having a met demand. Also, the odds of satisfying contraceptive demand is significantly higher for women resident in the Volta (2.4), Ashanti (2.2), Brong Ahafo (2.9) and Upper West Regions (3.4).

<<Table 4 about here>>

For Model 2, age, recent sexual activity, wealth, region of residence and educational attainment are significant predictors of a woman's met demand for contraception. Neither decision-making nor economic autonomy are significant predictors of met demand. Women who had basic education up to middle level (JSS) had significantly greater odds of meeting contraceptive demand than women with no education.

Sexual activity is highly significant in predicting met demand (p=.000). Women who report either postpartum or non-postpartum abstinence have significantly lower odds of contraceptive use, .06 and .455 respectively. Again, controlling for sexual activity in Model 2 (Table 4) increases the statistical significance of decision-making autonomy in predicting met demand, from .493 to .065, though it is still not significant (α=.05)

In Model 2, the association between urban-rural residence and met demand disappears. Inclusion of recent sexual activity improves how well the model fits the data.

Discussion

Among cohabiting or married Ghanaian women, there is a high unmet demand for family planning though this estimate is usually overestimated when fecundity and intentions are not taken into consideration. The estimates indicate that about one-half of the women in the study

population did not use contraceptives though they were fecund and had no desire for childbirth. This differs from estimates by other studies that about two-thirds have an unmet need (Crissman et al., 2012; GSS et al., 2009). These estimates of unmet need fail to take into account women's stated intentions for contraceptive use and their sexual activity. The uniqueness of this study is that it estimates the effect of two dimensions of women's autonomy on meeting actual demand for female contraceptive methods (traditional, folkloric and modern).

Most importantly, the analysis revealed that neither household decision-making autonomy nor economic autonomy is associated with women's met demand for contraceptives. This is corroborative of the assertion by DeRose et al. (2002) that it will be specious to assume that decision-making and economic dimensions of women's autonomy are indicative of reproductive decision-making among Ghanaian women. They further assert that income-earning employment among Ghanaian and other West African women only fulfils their age-old traditional roles and may not significantly alter their reproductive decision-making or behaviour. This study shows that women's paid employment and economic autonomy do not predict met demand for contraception.

Contrary to findings from some studies (Al Riyami et al., 2004; Rahman et al., 2014; Saleem & Bobak, 2005; Woldemicael, 2009), the results of this paper show a weak association between two dimensions of women's autonomy and met demand for contraceptive methods. The discrepancy could be as a result of the differences in the measures of autonomy or empowerment variables employed in the various studies. The arbitrariness in the computation of the autonomy index by different studies typically presents a challenge for generalisation of results. Also, the questions to determine autonomy may usefully measure the construct in other developing contexts but not in SSA.

The connection between autonomy and contraceptive behaviour is not easy to fathom in the absence of male partners' opposition since there is no need for bargaining power. A

woman's ability to make certain household decisions or control financial resources in the sub-Saharan African context implies neither contraceptive uptake nor control over sexual and reproductive health. It appears that the ability to use contraceptives may be a product of autonomy if partners oppose its use. However, where partners do not oppose contraceptive use, women's autonomy becomes a redundant predictor as women have no need to bargain or negotiate contraceptive use. Further research, particularly qualitative, may be required to increase understanding of the mechanisms through which different dimensions of autonomy may influence contraceptive behaviour in different developing contexts with varying contraceptive prevalence. We further stress the call for additional inquiry into the contexts of women's autonomy. These results are generalizable to non-pregnant fecund women in union. Though the demand for family planning has been established, it is still unclear the effect of these dimensions of autonomy on the uptake of contraceptives. Thus, family planning programmes that target social and economic empowerment of women risk failure if contextual peculiarities are not taken into consideration.

Sexual activity is a very significant determinant of contraceptive use (Machiyama & Cleland, 2014). It also explains the lack of association between decision-making autonomy and unmet demand. Controlling for sexual activity greatly improves the statistical strength of decision-making autonomy. Its inclusion also improves the Nagelkerke R^2 value of the model. Thus, a key factor associated with women's contraceptive use and its relationship with autonomy is sexual activity. It is plausible to assume without caution that women who are sexually inactive are less likely to report contraceptive use than their sexually active counterparts. They are made up of a large part of those women who do not use contracetives. This group of abstaining women, strictly speaking, do not constitute need for contraception, much less demand. Contraceptive non-use among these substantially large groups of abstaining women may wrongly be identified as unmet need in certain circumstances.

The positive association between women's educational level and met demand for contraceptives is corroborated by previous findings in Ghana (Adanu et al., 2009; Crissman et al., 2012), and elsewhere (Odutolu et al., 2003; Al Riyami et al., 2004; Saleem & Bobak, 2005; Woldemicael, 2009). Education is an important tool in meeting contraceptive demand among women. The relationship between education and met demand does not appear to be a linear one however, as the difference between women with no education and those with secondary or higher lacks statistical significance (α=.05).

Geographical differences in met demand are mixed. We found that women resident in the Brong Ahafo, Volta and Upper West Regions have significantly higher odds of contraceptive use compared with women in the Northern Region. However, there is weak association between rural-urban residence and satisfied demand when sexual activity is controlled for. Machiyama & Cleland (2014) note the increasing resort to periodic abstinence by urban women to control childbirth.

When socioeconomic and demographic variables are controlled for, age still shows a statistically significant association with meeting demand. The youngest women have the lowest met need for contraception as unmet need declines with age (GSS et al., 2009; Ortayli & Malarcher, 2010). Hostility from service providers - which older women do not face - as well as other socioeconomic and cultural barriers, possibly explains the lower levels of met demand by younger women.

Conclusion

Having established the demand for family planning, this study determined the effect of household decision-making and economic dimensions of women's autonomy in meeting their demand for contraceptives. In the study, we established women's demand for contraceptives by including in our sample only fecund women with a stated positive attitude toward

contraceptives and a desire to postpone or cease childbearing. The findings, juxtaposed with findings of other studies, suggest that neither dimension of women's autonomy is significantly associated with contraceptive use. The association between autonomy and contraceptive use is thus contextual. Significant factors of contraceptive use include education, household wealth, age and region of residence. Women's sexual activity seems a critical factor in predicting uptake of contraceptive services, thus it may be detrimental to ignore it in the traditional estimation of unmet need or demand. It is also imperative to consider the preferences of male partners and to assess couple's contraceptive demand in future studies. We contend that family planning programmes aimed at empowering women must take into consideration local contexts and consider both demand and supply-side factors.

References

Adanu, R. M. K., Seffah, J. D., Hill, A. G., Darko, R., Duda, R. B., & Anarfi, J. K. (2009). Contraceptive use by women in Accra, Ghana: results from the 2003 Accra Women's Health Survey. *African Journal of Reproductive Health, 13,* 123–133. doi:10.2307/20617099

Ahmed, S., Creanga, A. A., Gillespie, D. G., & Tsui, A. O. (2010). Economic status, education and empowerment: Implications for maternal health service utilization in developing countries. *PLoS ONE, 5*. doi:10.1371/journal.pone.0011190

Al Riyami, A., Afifi, M., & Mabry, R. M. (2004). Women's autonomy, education and employment in Oman and their influence on contraceptive use. *Reproductive Health Matters, 12*, 144–154. doi:10.1016/S0968-8080(04)23113-5

Bankole, A., & Westoff, C. F. (1998). The Consistency and Validity of Reproductive Attitudes: Evidence from Morocco. *Journal of Biosocial Science, 30*(04), 439–455. Retrieved from http://journals.cambridge.org/abstract_S0021932098004398

Blanc, A. (2001). The effect of power in sexual relationships on sexual and reproductive health: An examination of the evidence. *Studies in Family Planning, 32*, 189–213. doi:10.1111/j.1728-4465.2001.00189.x

Bloom, S. S., Wypij, D., & Das Gupta, M. (2001). Dimensions of women's autonomy and the influence on maternal health care utilization in a north Indian city. *Demography, 38*(1), 67-78. doi:10.1353/dem.2001.0001

Bradley, S. E. K., & Casterline, J. B. (2014). Understanding Unmet Need: History, Theory, and Measurement. *Studies in Family Planning, 45*(2), 123–150.

Bradley, S. E. K., Croft, T. N., Fishel, J. D., & Westoff, C. F. (2012). *Revising Unmet Need for Family Planning*. *DHS Analytical Studies No. 25* (pp. i – xiii, 1–75). Retrieved from http://measuredhs.com/pubs/pdf/AS25/AS25.pdf

Caldwell, J. C., & Caldwell, P. (1987). The Cultural Context of High Fertility in Africa sub-Saharan. *Population and Development Review, 13*(3), 409–437.

Callahan, R., & Becker, S. (2014). Unmet need, intention to use contraceptives and unwanted pregnancy in rural bangladesh. *International Perspectives on Sexual and Reproductive Health, 40*, 4–10. doi:10.1363/4000414

Cleland, J., Harbison, S., & Shah, I. H. (2014). Unmet Need for Contraception: Issues and Challenges. *Studies in Family Planning, 45*, 105–122. doi:10.1111/j.1728-4465.2014.00380.x

Crissman, H. P., Adanu, R. M., & Harlow, S. D. (2012). Women's Sexual Empowerment and Contraceptive Use in Ghana. *Studies in Family Planning, 43*, 201–212. doi:10.1111/j.1728-4465.2012.00318.x

DeRose, L. F., Dodoo, N., & Patil, V. (2002). Schooling and Attitudes on Reproductive-Related Behavior in Ghana. *International Journal of Sociology of the Family*, *30*(1), 50–65.

Do, M., & Kurimoto, N. (2012a). Women's Empowerment and Choice of Contraceptive Methods in Selected African Countries. *International Perspectives on Sexual and Reproductive Health*. doi:10.1363/3802312

Do, M., & Kurimoto, N. (2012b). Women's Empowerment and Choice of Contraceptive Methods in Selected African Countries. *International Perspectives on Sexual and Reproductive Health*, *38*(1), 23–33.

Dodoo, F. N.-A. (1993). A couple analysis of micro-level supply/demand factors in fertility regulation. *Population Research and Policy Review*, *12*, 93–101. doi:10.1007/BF01074559

Dodoo, F. N.-A., & Landewijk, P. Van. (1996). Men, Women, and the Fertility Question in Sub-Saharan Africa : An Example from Ghana. *African Studies Review*, *39*(3), 29–41.

Ghana Statistical Service (GSS), Ghana Health Service (GHS), & ICF Macro (IM). (2009). *Ghana Demographic and Health Survey, 2008* (Vol. 21). Accra, Ghana: GSS, GHS, and ICF Macro. doi:10.2307/1966619

Graham, C. A., Catania, J. A., Brand, R., Duong, T., & Canchola, J. A. (2003). Recalling sexual behavior: a methodological analysis of memory recall bias via interview using the diary as the gold standard. *Journal of Sex Research*, *40*, 325–332. doi:10.1080/00224490209552198

Hou, X., & Ma, N. (2013). The effect of women's decision-making power on maternal health services uptake: Evidence from Pakistan. *Health Policy and Planning*, *28*, 176–184. doi:10.1093/heapol/czs042

Jejeebhoy, S. J., & Sathar, Z. A. (2001). Women's Autonomy in India and Pakistan: The Influence of Religion and Region. *Population and Development Review*, *27*(4), 687–712. doi:10.1111/j.1728-4457.2001.00687.x

Kamiya, Y. (2011). Women's autonomy and reproductive health care utilisation: empirical evidence from Tajikistan. *Health Policy*, *102*(2-3), 304–313. doi:10.1016/j.healthpol.2011.04.001

Lesthaeghe, R., & Vanderhoeft, C. (2001). Ready, willing and able: A Conceptualization of Transitions to New Behavioral Forms. In *Diffusion Processes and Fertility Transition: Selected Perspectives*. doi:10.5195/mitrip.2012.16

Machiyama, K., & Cleland, J. (2014). Unmet Need for Family Planning in Ghana: The Shifting Contributions of Lack of Access and Attitudinal Resistance. *Studies in Family Planning*, *45*, 203–226. doi:10.1111/j.1728-4465.2014.00385.x

Malarcher, S., & Polis, C. B. (2014). Using measurements of unmet need to inform program investments for health service integration. *Studies in Family Planning*, *45*(2), 263–75. doi:10.1111/j.1728-4465.2014.00388.x

Mills, S., Bos, E., & Suzuki, E. (2010). Unmet need for contraception. Washington DC: World Bank.

Mumtaz, Z., & Salway, S. (2005). "I never go anywhere": Extricating the links between women's mobility and uptake of reproductive health services in Pakistan. *Social Science and Medicine*. doi:10.1016/j.socscimed.2004.08.019

Odutolu, O., Adedimeji, A., Odutolu, O., Baruwa, O., & Olatidoye, F. (2003). Economic empowerment and reproductive behaviour of young women in Osun state, Nigeria. *African Journal of Reproductive Health*, *7*(3), 92–100.

Ortayli, N., & Malarcher, S. (2010). Equity analysis: Identifying who benefits from family planning programs. *Studies in Family Planning*, *41*, 101–108. doi:10.1111/j.1728-4465.2010.00230.x

Rahman, M., Mostofa, G., & Hoque, A. (2014). Sexual & Reproductive Healthcare Women's household decision-making autonomy and contraceptive behavior among Bangladeshi women. *Sexual & Reproductive Healthcare*, *5*(1), 9–15. doi:10.1016/j.srhc.2013.12.003

Saleem, A., & Pasha, G. R. (2008). Women's reproductive autonomy and barriers to contraceptive use in Pakistan. *The European Journal of Contraception Reproductive Health Care the Official Journal of the European Society of Contraception*, *13*(1), 83–89.

Saleem, S., & Bobak, M. (2005). Women's autonomy, education and contraception use in Pakistan: a national study. *Reproductive Health*, *2*, 8. doi:10.1186/1742-4755-2-8

Sedgh, G., Hussain, R., Bankole, A., & Singh, S. (2007). *Women with an Unmet Need for Contraception in Developing Countries and Their Reasons for Not Using a Method Occasional Report No . 37*.

Westoff, C. F. (1988). Is the KAP-Gap Real? *Population and Development Review*, *14*, 225–232.

Woldemicael, G. (2009). Women's autonomy and reproductive preferences in Eritrea. *Journal of Biosocial Science*, *41*(2), 161–181.

World Health Organization. (2010). *World Health Statistics 2010*. *World Health* (p. 177).

Figures and Tables

Table 1. Percentage distribution of women by their involvement in decision making for their household decision-making and household economic autonomy (N=1086)

Variable	Percent (Number)		
	Respondent not involved	Respondent jointly involved	Respondent alone involved
Household decision making autonomy			
Obtaining healthcare	32.9 (357)	43.1 (468)	24.0 (261)
Making large household purchases	42.0 (456)	39.5 (429)	18.5 (201)
Making daily household purchases	21.1 (230)	34.1 (369)	44.8 (487)
Visits to relatives and friends	16.5 (179)	59.8 (649)	23.7 (258)
Number of children	19.5 (212)	65.1 (706)	15.4 (168)
Household economic autonomy			
Respondent's earnings	24.6 (266)	26.7 (291)	48.6 (529)
Partner's earnings	57.1 (620)	35.4 (384)	7.5 (82)

Computed from GDHS 2008

Table 2. Percent distribution of fecund in-union women with met demand, by selected characteristics

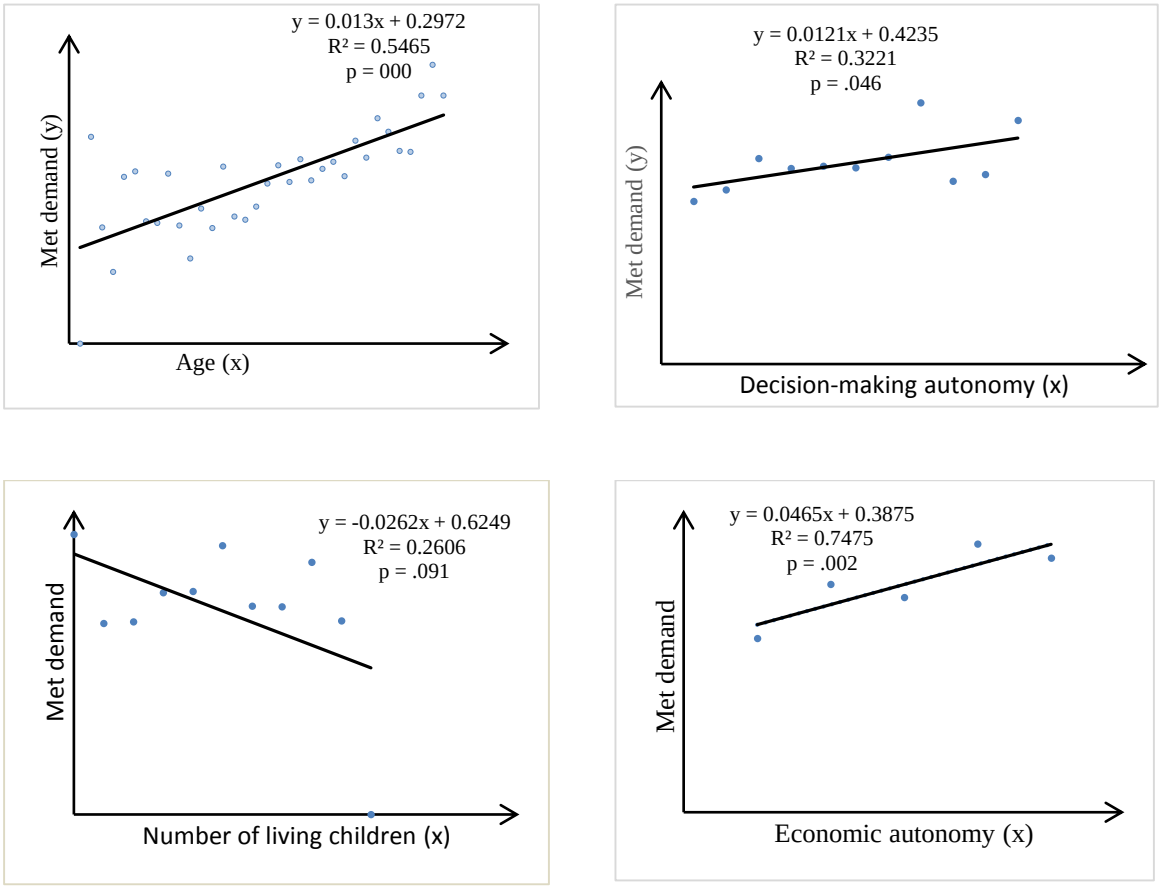
Categorical Variables	Frequency (Percent)	Proportion with met demand (%)
Educational Attainment		***
None	368(33.8)	35.3
Primary	264(24.3)	53.4
Middle/JSS	358(33.1)	60.8
Secondary and higher	96(8.8)	56.2
Type of place of residence		***
Urban	397(36.6)	57.0
Rural	689(63.4)	45.9
Region		***
Northern	93(9.5)	39.8
Central	77(7.1)	54.5
Greater Accra	119(11.0)	65.0
Volta	105(9.7)	63.8
Eastern	102(9.4)	53.4
Ashanti	166(15.3)	57.8
Brong Ahafo	99(9.1)	55.6
Western	103(8.6)	21.5
Upper East	100 (9.2)	30.0

Upper West	122(11.2)	49.2
Ethnicity		***
Akan	467(43.0)	54.9
Ewe/Ga-Dangme	203(18.7)	62.6
Mole-Dagbani/Grussi/Gruma/Mande	356 (32.8)	36.7
Other	60(5.5)	48.3
Religion		***
Moslem	159(14.6)	38.1
Catholic	165(15.2)	52.7
Other Christian	625(57.6)	54.5
Traditionalist/Spiritualist/Others	89(8.2)	36.0
No religion	48(4.4)	47.9
Employment status		*
Unemployed	72(6.6)	45.8
Unpaid employment	98(9.0)	36.7
Paid employment	916(84.3)	51.7
Wealth quintile		***
Poorest	307(28.3)	34.5
Poorer	228(21.0)	46.5
Middle	173(15.9)	53.2
Richer	208(19.2)	59.8
Richest	170(15.7)	67.3
Recent sexual activity		***
Active	641(59.1)	63.7
Not active – postpartum	167(15.3)	6.6
Not active – not postpartum	278(25.6)	44.2
Contraceptive Use		na
No method	543(50.0)	na
Any method	543(50.0)	na
Total	**1086 (100.0)**	**50.0**

Non-categorical variables	**Mean**	**Standard Deviation**	**Range**
Household decision-making autonomy	4.94	2.26	0-10
Household economic autonomy	1.74	0.97	0-4
Age	32.2	7.7	15-49
Number of living children	3.4	1.9	0-10

Significant at *p<0.05; **p<0.01; ***p<0.001
Computed from GDHS 2008; na = not applicable

Figure 1 Linear regression estimates of the relationship between proportions of met demand (y) and women's autonomy, age and number of living children (x)



Computed from GDHS 2008

Table 3. Odds ratio estimates of met demand for contraceptives, by women's autonomy and socio-demographic characteristics

	Model 1		
Variable	**Exponent (B)**	**Standard Error**	**Significance**
Household decision making autonomy (0-10)	1.022	.031	.493
Household economic autonomy (0-4)	.966	.088	.693
Age	1.060	.013	.000
Number of living children	.967	.055	.543
Educational Attainment			
None (r)			
Primary	1.884	.196	.001
Middle/JSS	2.002	.214	.001
Secondary and higher	1.225	.308	.509

Type of place of residence			
Urban (r)			
Rural	1.563	.195	.022
Region			
Northern (r)			
Central	1.724	.327	.096
Greater Accra	1.778	.322	.074
Volta	2.358	.364	.019
Eastern	1.467	.313	.220
Ashanti	2.233	.275	.003
Brong Ahafo	2.897	.311	.001
Western	1.033	.410	.937
Upper East	1.304	.407	.514
Upper West	3.371	.375	.001
Ethnicity			
Akan (r)			
Ewe/Ga-Dangme	1.703	.246	.030
Mole-Dagbani/Grussi/Gruma/Mande	1.215	.300	.516
Other	1.592	.350	.184
Religion			
Moslem (r)			
Catholic	1.496	.269	.135
Other Christians	1.425	.254	.163
Traditionalist/Spiritualist/Others	1.232	.326	.523
No religion	1.470	.388	.321
Employment status			
Unemployed (r)			
Unpaid employment	.993	.353	.985
Paid employment	1.404	.300	.258
Wealth quintile			
Poorest (r)			
Poorer	1.420	.213	.099
Middle	2.009	.247	.005
Richer	2.942	.273	.000
Richest	4.301	.337	.000

Computed from GDHS 2008; Nagelkerke R^2 = .194; Cox & Snell R^2 = .145
Significant at *p<0.05; **p<0.01; ***p<0.001 (r) = Reference category

Table 4. Binary logistic regression model displaying estimates of odds of the effect of women's autonomy, sexual activity and socio-demographic characteristics on met demand for contraceptives

	Model 2		
Variable	**Exponent (B)**	**Standard Error**	**Significance (p-value)**
Household decision-making autonomy (0-10)	1.066	.034	.064
Household economic autonomy (0-4)	.953	.095	.613
Age	1.050	.014	.001
Number of living children	.983	.059	.768
Educational Attainment			
None (r)			
Primary	1.905	.215	.003
Middle/JSS	2.031	.231	.002
Secondary and higher	1.418	.333	.294
Type of place of residence			
Urban (r)			
Rural	1.388	.212	.122
Region			
Northern (r)			
Central	1.534	.464	.356
Greater Accra	1.646	.454	.273
Volta	2.537	.471	.048
Eastern	1.289	.440	.564
Ashanti	1.638	.406	.224
Brong Ahafo	2.305	.420	.047
Western	.821	.435	.651
Upper East	1.080	.410	.851
Upper West	4.107	.382	.000
Ethnicity			
Akan (r)			
Ewe/Ga-Dangme	1.597	.257	.069
Mole-Dagbani/Grussi/Gruma/Mande	1.295	.318	.416
Other	1.691	.372	.158
Religion			
Moslem(r)			
Catholic	1.474	.297	.192
Other Christians	1.316	.277	.321
Traditionalist/Spiritualist/Others	1.178	.362	.652
No religion	1.669	.437	.241
Employment status			
Unemployed (r)			
Unpaid employment	.968	.383	.932
Paid employment	1.477	.325	.230
Wealth quintile			
Poorest (r)			

Poorer	1.304	.233	.254
Middle	1.762	.267	.034
Richer	2.638	.295	.001
Richest	2.982	.360	.002
Sexual activity			
Active (r)			
Not active – postpartum	.047	.340	.000
Not active – not postpartum	.379	.163	.000

Nagelkerke R^2 = .344; Cox & Snell R^2 = .258
Significant at *p<0.05; **p<0.01; ***p<0.001 (r) = Reference category
Computed from GDHS 2008