Women’s empowerment and contraceptive use: a community-based survey in peri-urban Kumasi, Ghana [version 1; peer review: 3 not approved]

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Abstract

Background: Many reasons have been used to explain why contraceptive uptake in Ghana has not been as impressive as desired. One area that has not received enough attention is that of women’s empowerment. This study sought a better understanding of how women’s empowerment influences contraceptive uptake.

Methods: A structured questionnaire was used to interview 761 currently married or cohabiting women aged 15-49 years who were residents of Asawasi and Oforikrom for at least two years and consented to be part of the study. Bivariate and multivariate analyses were used to link the exposure variables: the three measures of empowerment and other variables such as age, marital status, religion, education, ethnicity, income and number of living children with the outcome variable (current or future contraceptive use). Excel was used for data entry and STATA for analyses.

Results: In total, 29% of respondents were empowered in all the three categories used to measure empowerment in this study; 34% were empowered in two of the three categories, 29% were empowered in only one category while 9% of the women were not empowered in any of the categories. In multivariate logistic regression analysis, the odds of empowered women using contraceptives was significantly higher than the odds of women who were not empowered.

Conclusions: Provision of economic interventions to empower and uplift conditions of women is needed to bring change in the economic status of their families and remove their dependence upon family members. This would make women in peri-urban Kumasi economically independent in making contraceptive choices and decisions, which would help in the realization of the Sustainable Development Goals: One (to end poverty in all its forms everywhere) and Five (to achieve gender equality and empower all women and
girls).

**Keywords**
Empowerment, Contraceptives, Sustainable Development Goals

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Introduction

The measure of women’s empowerment varies among different regions in the world and within countries. Most studies reviewing women’s empowerment used secondary data, mostly from demographic and health surveys of countries, which usually present national data, and may considerably mask lower level differentials (Kishor & Subaiya, 2008; Saraswati & Mukherjee, 2012; Yihunie Lakew et al., 2011). This study provided household level data in peri-urban Kumasi to show various categories of empowerment, such as economic security and contribution to family, freedom from family domination, and mobility. These three categories together could influence a woman’s use of contraception. The results of the study would be essential for health planning and management, particularly in resource-poor settings such as the Ashanti Region. The findings can also be used to guide programs that could lead to an overall improvement in the reproductive health status of women.

The International Conference on Population and Development which took place in Cairo, Egypt in 1994 decided on a programme of action which emphasised that: “the empowerment and autonomy of women and the improvement of their political, social, economic and health status is both a highly important end in itself and necessary for the achievement of sustainable human development.” It mentions that: “Advancing gender equality and equity, and the empowerment of women, and the elimination of all kinds of violence against women, and ensuring women’s ability to control their own fertility are priority objectives of the international community.” (UNFPA, 1995) As a result of this, women empowerment is a significant factor to promote female access to family planning.

Unfair gender and social norms grant control of women’s needs to others in the family, limit their potential to take part in decision-making, limit their mobility and their permission to use family resources, and give them minimal reason to expect good-quality and well-mannered healthcare services. It has also been observed that there is a power change when inequitable gender and social norms are directly addressed, and people are helped to think differently about their roles and rights as women and men to make informed decisions about their reproductive choices. The primary requirement for women to control their fertility is to empower them. The basic requirement for women’s health, wellbeing, and rights is to empower them with the ability to manage their fertility. Women’s empowerment also overcomes barriers at family and community levels and increases women’s ability to make decisions about their family size or spacing of pregnancies (Grown et al., 2005; Klugman et al., 2014).

Women’s empowerment is defined as: “an expansion in the range of potential choices available to women so that actual outcomes reflect the particular set of choices which the women value” (Kishor & Subaiya, 2008). Empowerment itself is described as the process by which the powerless gain greater control over their lives, gaining power not over others but to achieve goals and ends (Gupta & Yesudian, 2006; Kishor & Subaiya, 2008). According to Malhotra, even though the empowerment process is applicable to both sexes, it is more relevant for women. This is because disempowerment of women is more prevalent and difficult to understand because household and inter-family relationships are a major source of women’s powerlessness (Malhotra & Schuler, 2005).

Governments and donor agencies working all over the world to improve women’s access to economic resources, political, social and health status, reflect the fact that improvements in the condition of women, which are essential for achieving sustainable development, cannot be separated from advancements in women’s rights. One such focus area requiring gender-related action is the development and evaluation of ways that aim to promote positive reproductive health outcomes. Around the globe, women are restricted in their ability to make decisions or participate in decision-making concerning family planning or even to have open discussions with their partners about it due to lack of power (Blanc, 2001; Bawah et al., 1999). Cleland found out that the benefits of using contraception have been widely discussed, and the rise in its use in developing countries has been associated with a reduction in fertility, reduction of both child and maternal mortality, improvements in women empowerment, and poverty reduction among others (Cleland et al., 1996).

Ghana was one of the first countries to embrace a clear and all-inclusive population policy in sub-Saharan Africa. This policy, which was promulgated in 1969, aimed at reducing the growth rate of the population and offer individuals access to, and freedom to choose from, several family planning methods for spacing and limiting births. The policy was later reviewed in 1994 to take account of other emanated issues such as HIV/AIDS and to place a renewed emphasis on spacing and limiting births. It also aimed to reduce the total fertility rate through increased contraception (Ghana National Population Council, 1994). Since then, through the activities of many social organizations, family planning has become common in Ghana. The 2014 Ghana Demographic and Health Survey indicates that knowledge of contraceptive methods is universal in Ghana. In total, 98% and 99% of all men and all women, respectively, know at least one method of contraception. Among currently married women, knowledge of contraception is similar to that among all women, especially regarding level of knowledge. Of currently married women, 98% know at least one method of contraception or a modern method. Modern methods of contraception which are generally known in Ghana include condoms, sterilisation, the pill, the intrauterine device, injectable, implants, foam tablets and jelly (GSS/GHS/ICF International, 2015).

Despite this high level of awareness of contraception and the fact that family planning programmes have become well established in Ghana, progress on increasing utilization of contraception has not improved especially among married women. Between 2008 and 2014, the use of all methods of contraception marginally increased (from 24% to 27%), while the use of modern methods also increased (from 17% to 22%) among married women (GSS/GHS/ICF macro, 2009; GSS/GHS/ICF...
International, 2015). However, these figures are still much too low. The use of contraceptives among married women has nearly doubled in the past 20 years in Ghana. Past studies have indicated an increase in contraceptive use in the late 1980s and 1990s, from 13 to 22% among married women. However, over the past ten years, the changes have been unimpressive and sometimes negative. The prevalence rate for contraceptive use went up from 22% among currently married women in 1998 to 25% in 2003; it went down for five years until 2008, which was 24% but increased again to 34.3% in 2010. The overall picture has been one of inadequate progress made and missed targets (GSS/GHS/ICF macro, 2009; WHO, 2010).

Factors such as education, level of income, spousal consent, place of residence and religion determine contraceptive adoption and use among women (Chudasama et al., 2008; Kaggwa et al., 2008; Salway, 1994). Empowerment of women should not be ignored if satisfactory progress is to be made in increasing contraceptive utilization (GSS/GHS/ICF macro, 2009).

The benefit of empowering women is a pathway for achieving the Sustainable Development Goals: One (to end poverty in all its forms everywhere), Four (to ensure inclusive and quality education for all and promote lifelong learning) and Five (to achieve gender equality and empower all women and girls) (UNDP, 2015). Empowering women is a cornerstone of development because it helps build healthier, better-educated, and more peaceful and prosperous societies. There is a reduction in poverty, economies flourish, and the health of children and mothers improves when women are empowered in society. Additionally, women are able to make important decisions within the household and participate meaningfully and visibly in the society in which they live. Empowering women gives them the ability to make decisions about their body and their reproductive health, make better use of reproductive health and family planning information and services which enables them to achieve their desired family size (Srivastava, 2009).

It is against this background that this study set out and investigated the impact that women’s empowerment has on current and future contraceptive use, taking into account socio-economic, demographic and other factors.

Methods
Study background
This was a community-based cross-sectional study with a quantitative approach. Data were collected at one point in time from the study population. The study population was women aged 15–49 years who were married or cohabiting at the time of the study. The study used the sampling frame of the Family Health and Wealth Study (FHWS) in Asawase, Kumasi; details of the FHWS study approach has been published elsewhere (OlaOlorun et al., 2016). In short, the FHWS is a longitudinal open-cohort study in Asawase and Oforkrom sub-metropolitan area (peri-urban Kumasi) that is looking at the relationship between family size, wealth and health. The FHWS has been on-going since 2009 and it has had three rounds of data collection. Data for the current study were collected from four well-defined clusters (A, B, C, and D) between April and June 2014.

Study area and participant selection
The study area for the Family Health and Wealth Survey covered Oforkrom, which has 25 electoral areas, and Asawase, which has 100. There were eight electoral areas randomly selected from Oforkrom and 32 from Asawase, giving 40 electoral areas. A census of households and structures (listed and clearly identified with numbers) in these electoral areas was undertaken. Sampling frames of the eligible households and structures were developed for the study area in Oforkrom and the three study areas in Asawase giving four clusters (A, B, and C, D). Households were systematically selected. In the households with more than one eligible family (couple), one couple was randomly selected. In all, 20 families from each electoral area were selected, which summed up to 800 families for the FHWS (OlaOlorun et al., 2016).

Since the current study was nested in the FHWS, a sampling frame was constructed with the list of all the 800 FHWS households. One married/cohabiting woman aged 15–49 years, who was willing to be part of the study, was randomly sampled from each of the randomly selected households.

The 800 women in the households, captured under the FHWS round II, served as the study sample for the current study; 761 of the women who were randomly selected, consented to participate in the current study.

Survey questions
Each respondent was interviewed in the Ashanti Twi language. Before each interview, the objective of the research was communicated to the respondents in detail for them to understand and give their consent. Respondents were assured of anonymity and the confidentiality of their responses and all other information gathered. The inclusion criteria were: current contraceptive users (using contraceptive at the time of the study) or intended to use contraceptive in future, willing and able to give informed consent, aged between 15–49 years, married or living with a man (the study did not consider the type of marriage, once the woman reported that she was married or cohabiting she was eligible to be studied), and a resident of the study area for at least two years. At the end of each study, all questionnaires were checked for completeness and consistency. Women who were not using any method of contraception at the time of the study, and did not intend to use contraceptive in future were excluded.

The survey instrument included questions on age, religion, level of education, ethnicity, number of living children and how much they earned. Age in complete years was categorized as 24 years, 25–29 years, 30–34 years, 35–39 years, 40–44 years and 45–49 years. Marital status was defined as married or cohabiting. Parity was defined as the number of living children and was grouped as 0–1, 2–3 and 4 or more. Education level was defined as no formal, primary, middle or Junior High School and Secondary or Higher. The secondary and tertiary education...
categories were collapsed due to the small percentage of women with tertiary education. Religion was also categorised as Catholic, other Christians, Muslim and Traditional or Spiritualist due to their varied beliefs on contraceptive use.

The survey instrument had two major components: family planning and empowerment. A screening question on contraceptive use inquired whether a respondent was currently using (use at the time of the survey) or had the intention to use any family planning method in future. There were two questions that probed reproductive control, namely if she had decided to have more children and if she intends to use contraceptives after having a child. Questions used to determine empowerment focused on economic security and contribution, freedom from family domination, and mobility.

The empowerment questions were developed based on an empowerment scale, which was adopted from Maholtra and Schuler (Maholtra & Schuler, 2005). Specifically, for mobility, we asked whether respondents required permission from their husbands/partners to attend an organizational meeting, visit parents, travel outside the home, see a health care worker or to access family planning. Every respondent was given a single point for each place she had visited, a single point if she had ever gone there alone and an additional point if she went without the husband’s/partner’s approval. The scale ranged from 0 to 12 and was treated as a continuous variable. For the purposes of this study, a score from 1 to 6 was considered as not empowered and a score from 7 to 12 was considered as empowered for easy analysis.

For economic security and contribution, the respondent was asked whether she required permission from her husband/partner to earn money, own a property in her name, have a savings account, and own any productive asset, and what proportion of her total household expenses was met through her own earnings. Two variables were used in this analysis, economic security and contribution to family support. Economic security was based on a scale from 0 to 4. One point was assigned for each of the following: if a woman owned her house or land, owned any productive asset, had her own cash savings and if her savings were ever used for business or money lending or treasury bills. A woman with a score of 2 or higher was classified as empowered for easy analysis. Contribution to family support measured if the respondent said she provided all, most, half, or some of her family’s support, as opposed to very little or none.

For freedom from family domination, the respondent was asked if her husband had ever prevented her from: using her own money, visiting her parents, working outside the home, accessing family planning services or taken her money when she didn’t want him to. If she answered ‘no’ to all these she was classified as “empowered” and coded 1; the group “not empowered,” was coded as 0.

Data analysis
The items on the scales were collapsed into two categorical variables, empowered and not empowered, for chi-square analysis. Based on the empowerment scale, the women were empowered or not empowered in terms of economic security and contribution to family support, freedom from family domination scores and mobility (Nanda, 2011).

Double data entry into a pre-designed electronic database record form using EPI Info version 7 was done and later exported into STATA version 12 for analysis. Bivariate regression analyses were run to investigate the relationships between current contraceptive use, categorical and continuous independent variables. Multivariate logistic regression was used to determine associations between the various category of women’s empowerment, and current or future contraceptive use. Categorical variables (binary, ordinal and nominal) were presented in proportions and ratios with their 95% confidence intervals. The continuous variables were presented as means with their ranges and standard deviations. For multivariate analyses chi-square was used to establish any difference in proportions. The relationships between the empowerment dimensions and contraceptive use or intention to use were analyzed and presented as odds ratios and adjusted odds ratios with 95% confidence interval and p-values. P≤0.05 was considered to indicate statistical significance.

Ethical considerations
The Committee of Human Research, Publications and Ethics of the Kwame Nkrumah University of Science and Technology/ Komfo Anokye Teaching Hospital approved the study. The Kumasi Metropolitan Directorate of Health Services and leaders of the various communities provided administrative clearance.

Written informed consent with respondents’ anonymity, privacy and confidentiality assured was obtained from all participants. The respondents’ autonomy was protected and there was no coercion of any sort. All information collected in this study was given code numbers and no name was recorded so that the reports cannot be easily linked with their names.

Results
Demographic information
Almost two-thirds (62%) of the respondents were less than 35 years of age. The mean age of the respondents was 34.2 years with a range of 18 to 49 years. More than 74% were married. A little over 60% of respondents were Christians. More than 26% had only primary education, with 23% having had secondary education or higher. Akan accounted for the largest proportion of respondents by ethnic groupings (50%). Of the respondents, 16% had not received any formal education. A little under half (47%) of the respondents earned less than 200 Ghanaian Cedis monthly, equivalent to 50 US dollars. Nearly half (49%) of the respondents have two or three living children (Table 1). Responses to each question of the survey from each participant are available as Underlying data (Ansong et al., 2019).

Contraceptive use and women’s empowerment
In total, 46% of the women sampled were using contraceptives at the time of the survey as compared to 54% who intended to use a contraceptive method in future.
Table 1. Socio-demographic characteristics.

<table>
<thead>
<tr>
<th>Variables</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age, years</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25–29</td>
<td>200</td>
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</tr>
<tr>
<td>30–34</td>
<td>158</td>
<td>20.8</td>
</tr>
<tr>
<td>35–39</td>
<td>136</td>
<td>17.8</td>
</tr>
<tr>
<td>40–44</td>
<td>88</td>
<td>11.6</td>
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<tr>
<td>45–49</td>
<td>64</td>
<td>8.4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>761</td>
<td>100</td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
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<td></td>
</tr>
<tr>
<td>Married</td>
<td>570</td>
<td>74.9</td>
</tr>
<tr>
<td>Cohabiting</td>
<td>191</td>
<td>25.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>761</td>
<td>100</td>
</tr>
<tr>
<td><strong>Religion</strong></td>
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<td></td>
</tr>
<tr>
<td>Catholic</td>
<td>57</td>
<td>7.5</td>
</tr>
<tr>
<td>Other Christians</td>
<td>406</td>
<td>53.4</td>
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<tr>
<td>Muslim</td>
<td>245</td>
<td>32.2</td>
</tr>
<tr>
<td>Traditional/spiritualist</td>
<td>53</td>
<td>6.9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>761</td>
<td>100</td>
</tr>
<tr>
<td><strong>Education level</strong></td>
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<td></td>
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<tr>
<td>None</td>
<td>121</td>
<td>15.9</td>
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<tr>
<td>Primary</td>
<td>199</td>
<td>26.2</td>
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<tr>
<td>Middle/JHS</td>
<td>268</td>
<td>35.2</td>
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<tr>
<td>Secondary/Higher</td>
<td>173</td>
<td>22.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
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<td>100</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
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<td></td>
</tr>
<tr>
<td>Northern Ghana group</td>
<td>192</td>
<td>25.2</td>
</tr>
<tr>
<td>Other</td>
<td>191</td>
<td>25.1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>761</td>
<td>100</td>
</tr>
<tr>
<td><strong>Income</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GH₵≤200</td>
<td>122</td>
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<tr>
<td>GH₵201–500</td>
<td>239</td>
<td>31.4</td>
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<tr>
<td>GH₵501–1000</td>
<td>209</td>
<td>27.4</td>
</tr>
<tr>
<td>GH₵1001–2000</td>
<td>139</td>
<td>18.2</td>
</tr>
<tr>
<td>GH₵&gt;200</td>
<td>52</td>
<td>6.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>761</td>
<td>100</td>
</tr>
<tr>
<td><strong>No. of living children</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0–1</td>
<td>159</td>
<td>22.9</td>
</tr>
<tr>
<td>2–3</td>
<td>341</td>
<td>49.2</td>
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<td>4–11</td>
<td>193</td>
<td>27.9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>761</td>
<td>100</td>
</tr>
</tbody>
</table>

Based on the three scales used in the study, 218 (29 %) of the respondents were empowered in all the three categories. A total of 255 (34%) of the respondents were empowered in two out of the three categories of empowerment measure, and 220 (29%) were empowered in only one category of the empowerment measure but 68 (9%) of them were not empowered in any of the categories (Figure 1).

In model 1 the three categories of empowerment were modelled as the main covariates against contraceptive use in a bivariate logistic regression model. Economic security and contribution empowerment (p=0.001) and mobility empowerment (p=0.016) were statically significant with current or future contraceptive use even though economic security and contribution had higher odds (odds ratio (OR)=1.91; 95% confidence interval (CI)=1.33, 2.73) than mobility empowerment (OR=1.07; 95% CI=1.01, 1.13) (Table 2).

Economic security and contribution (adjusted OR (aOR)=1.76; 95% CI= 1.06, 2.93) was found out to be statistically significantly associated with contraceptive use (p=0.027), whereas freedom from family movement (aOR= 0.93; 95% CI = 0.65, 1.32) and mobility (aOR= 1.34; 95% CI = 0.94, 1.90) were not significantly associated with contraceptive use (Table 2). The odds of empowered women using contraceptives was 1.76 times the odds of women who are not empowered as indicated in the aOR from the table.

**Discussion**

As a result of the International Conference on Population and Development, which took place in Cairo, Egypt in 1994, women empowerment has been a significant factor in promoting female access to family planning (UNFPA, 1995). Empowering women gives them the ability to make decisions about their body and their reproductive health and make better use of reproductive health and family planning information and services, which enables them achieve their desired family size (Srivastava, 2009). The measure of women’s empowerment varies among different regions in the world and within countries.

Based on the three scales used in the study, less than a third of the respondents were empowered in all the three categories. More than 35% of the respondents were empowered in two out of the three categories of empowerment measure, and 29% were empowered in only one category of the empowerment measure but about 1 in 10 of them was not empowered in any of the categories. This paper also confirmed the fact that even though knowledge and awareness of family planning methods are almost universal in Ghana, utilisation has been less than desired. This study found that 46% of the respondents were current contraceptive users; this is higher than the national figure reported by the 2014 GDHS. The NGO-funded family planning promotion that was on-going at the time of the study could be responsible for the seemingly high figure.
This study is limited by the fact that women’s empowerment and contraception are controversial topics and respondents may have given socially desirable answers. An additional limitation of this study was its cross-sectional nature, which makes it difficult to determine the temporal relationship between variables. However, despite these limitations, the study used random sampling with a well-established sampling frame and also used questions that were context-sensitive. The study also found a statistically significant association between economic security and contribution empowerment and current and future contraceptive use.

Conclusions
This study has highlighted key issues on the relationships between women’s empowerment and contraceptive use in a peri-urban setting in Sub-Saharan Africa. It is also one of the few attempts to provide an overview of a quantitative evidence-based study. Economic security and contribution to family empowerment was identified in this study as having an association with a woman’s current or future use of contraceptives. It can be concluded that women’s empowerment plays a significant role in the utilization of family planning services.

Data availability
Underlying data

This project contains the dataset in DTA and CSV formats.
Data are available under the terms of the Creative Commons Zero “No rights reserved” data waiver (CC0 1.0 Public domain dedication).

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Rohini Prabha Pande
Independent Research Consultant, Takoma Park, MD, USA

In the article titled “Women’s empowerment and contraceptive use: a community-based survey in peri-urban Kumasi, Ghana,” Ansong et al aim to analyse the impact of women’s empowerment on current and future contraceptive use in an area of Kumasi, Ghana. Using the sampling frame of the longitudinal, open-cohort Family Health and Wealth Study in Asawase, Kumasi, the authors collect and analyse cross-sectional data from four ‘clusters.’ They use multivariate logistic regression, and control for a range of socioeconomic and other background factors. After providing demographic information, they report that 46 percent of sampled women were currently using contraception while the remaining 54 percent intended to do so in the future. Using the empowerment scales they construct, the authors report that less than a third of respondents were empowered on all three categories of the authors’ scale. Their categories of “economic security and contribution” and “mobility” were found to be statistically significantly associated with the outcome. The authors conclude: “It can be concluded that women’s empowerment plays a significant role in the utilization of family planning services.”

I commend the authors for picking this important topic to study, and for building their work alongside other ongoing research. However, based on my review, I have rated this article “Not Approved.” There are several reasons. The sample included for analysis is inappropriate to answer the research question as described on p4 of 8, as is the construction of the outcome. Additionally, the way that women’s empowerment is conceptualized, defined, and measured is flawed, in my opinion. As a result, the authors’ key conclusion is not supported by their analysis. I expand on each point below.

The outcome and sample selected do not serve to answer the main research question: The authors aim to investigate factors that influence women's current and future contraception. However, their sample includes only women who either are currently using contraception or intend to do so in the future. The appropriate sample would include also women who are not currently using contraception and do not intend to use it in the future. Then the analysis could answer the research question by a comparison of the odds of contraceptive (now or in the future) relative to non contraceptive, among more vs. less empowered women, to discover how strong a
relationship exists between empowerment and contraceptive use. I see two options for the researchers going forward:

1. **Revise the sample and the outcome**: A more typical sample for contraceptive use studies is women in reproductive ages that are not currently pregnant or trying to get pregnant, that is, women who would conceptually be interested in and eligible to use contraception. The choice of married only versus all women needs to be justified. Then there are different ways to structure an outcome variable based on such a sample, given the authors' research question of interest:

   1. If the authors still want to separate intention to use contraception in the future from current use, the outcome variable could be structured as: 0=not using or intending to use contraception; 1=currently using contraception; 2=not currently using but intending to use contraception in the future. In this case, a multinomial and not logistic regression model would need to be used.

   2. Alternatively, the authors could analyse only current or ever-used contraception, or combine current/ever-used and intended future contraception and use a logit model where 0=not using or intending to use contraception.

   3. If the authors use intention to use contraception in the future, they will need to justify this choice. Current intentions do not always translate into future behaviour and thus “intention to use” is a less reliable measure of future contraception than is actual current or ever-use.

2. **Keep the present outcome (comparing current vs. future contraception) and accompanying sample but change the research question**. Perhaps there are reasons why the authors chose their present outcome. In that case they need to do the following:

   1. Clearly define the outcome: what is the reference category? Who is being compared to whom (the basis of a logit regression)?

   2. Why is this outcome of policy interest? Justify its choice relative to the more “usual” choice of outcome (contracepting vs. not contracepting and its variants).

   3. The research question will need to be changed. An appropriate research question for this sample would be to examine the extent to which women's empowerment is associated with intention to contracept in the future compared to current use of contraception.

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**Women's empowerment is unsatisfactorily conceptualized and inappropriately operationalized and measured**: The authors note that the empowerment questions in their survey were based on an empowerment scale adopted from Malhotra and Schuler, 2005. However, the authors' scale has several shortcomings that are discussed in Malhotra and Schuler (2005) and elsewhere, but which the authors did not take into account while constructing their scales. There are several key problems:

   1. The definition, choice of scales and choice of items within each scale (individually and as a part of a specific scale) are not contextualized. It is unclear to what extent the empowerment variables are contextually appropriate for the study are.
2. I would question the choice of items and scales, without addition information justifying them. One problem is that each of the items within each scale may have a different relationship with contraceptive use, thus making them inappropriate to combine as currently shown. For instance, requiring permission to see a health worker or to access family planning (an item in the mobility scale) and whether a husband ever forbade a woman from accessing family planning (an item in the family control scale) are likely to be similarly related to contraceptive use, but here are put into different scales. Similarly, within a particular scale – for instance the mobility scale – mobility related to health services is more likely to be associated with contraceptive use than is mobility to visit friends and family. Yet they are treated equally within the scale.

3. The numeric construction of the scales is also problematic. Two of the three scales are additive, with equal weight being given to all the components of the scale in defining whether the respondent is empowered in that domain. This is likely not an accurate depiction of reality unless the study context is unique. For example, research across the developing world finds that the extent of women’s mobility and its relationship to empowerment varies by where they are going. Visiting relatives is likely to be fairly accessible to a large range of women compared to accessing family planning. Thus, it is likely erroneous to assume that a woman who does not need to ask her husband’s permission to use family planning is as empowered as one who does not need her husband’s permission to visit relatives. The economic security scale has the same issue. The ‘freedom from family domination’ scale seems to be arbitrarily conservative, counting as ‘empowered’ only women whose husbands did not prevent them from a range of actions.

4. Finally, the scales are further compromised when they are each collapsed into dichotomous variables with seemingly arbitrary cut-offs that are not justified or explained.

5. The authors need to more clearly conceptualize ‘empowerment’ itself. Then the empowerment scales need to be created in a more systematic and contextually grounded manner. Some suggestions:

1. To conceptualize empowerment: I strongly suggest the authors incorporate additional path-breaking literature on empowerment and relate their chosen definition on p1 to the globally recognized issues of the role of agency, control, resources; the fact that empowerment is a process; that different aspects of empowerment are not identical and may not move in the same direction; that empowerment is contextual; and so on. Malhotra and Schuler (2005) is a great start but it is only one of many relevant research pieces to incorporate. See below for suggestions.

2. The minimum that the authors need to pay attention to in revising their empowerment scales: First, the authors need to use literature and their knowledge of the study area to justify why their chosen indicators of empowerment are relevant to the study site. Empowerment is contextual, as several researchers have noted. The chosen indicators of empowerment are generic. It is unclear whether and to what extent they are contextually appropriate. For instance, if most women in this community can go to visit family without asking a husband’s permission, then it is not an appropriate measure of empowerment. If the authors use the global indicators they are using at present for sake of international comparability, then each item could be given a
higher or lower weight to account for its relative importance in the study context as a measure of empowerment. Second, once selected, the authors need to check the independent association of each individual measure of empowerment with the outcome before deciding how to group them into scales. Finally, the authors need to justify scale construction and weights. I suggest using principal component analysis or something similar, or citing prior research from the study context, to structure the content and weighting of items in each index.

The authors need to cite more of the most relevant current and important historical literature on women’s empowerment, and on the relationship between women’s empowerment (or autonomy) and their reproductive choices.

1. Key literature on women’s empowerment or agency, and on the relationship between women’s agency or empowerment and reproductive outcomes needs to be referenced. Even if this literature is not Africa-specific or contraception-specific it provides important theoretical grounding for how to define and measure empowerment. Some examples:

2. There also seems to be a large recent literature on women’s empowerment and contraception in Ghana itself that should probably be referenced and used to contextualize the authors’ variable construction decisions. A quick Google Scholar search revealed several potentially relevant articles that have not been cited. The authors may have seen these and have reasons not to cite them but if not, I would suggest examining how other researchers in the country in which the study occurs (if not the study area itself) have conceptualized empowerment and the relationship between empowerment and contraception. A few examples of the many listed:

References

Is the work clearly and accurately presented and does it cite the current literature? Partly

Is the study design appropriate and is the work technically sound? No

Are sufficient details of methods and analysis provided to allow replication by others? No

If applicable, is the statistical analysis and its interpretation appropriate? No

Are all the source data underlying the results available to ensure full reproducibility? Yes

Are the conclusions drawn adequately supported by the results? No

**Competing Interests:** No competing interests were disclosed.

**Reviewer Expertise:** Gender inequality, conceptualization and measurement of women's
empowerment, reproductive and sexual health, demographic and qualitative research.

I confirm that I have read this submission and believe that I have an appropriate level of expertise to state that I do not consider it to be of an acceptable scientific standard, for reasons outlined above.

Reviewer Report 28 August 2019
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Summary
Contraceptive use and its determinants have been widely studied globally and in Ghana; however, the influence of women's empowerment on contraceptive use has not been widely studied within the African and Ghanaian context. This makes the study very important and timely, considering it's policy implications.

Introduction/Background
This section was well researched and written. However, quite a number of the references were over 10 years. Some current literature could be cited.

Methods/Analysis
The methodology suffers the following limitations:
1. The selection of the four clusters A, B, C and D were not clearly explained. Details of how the clusters emerged out of the electoral areas are not provided by the authors. It appears that they were purposively selected out of the 125 electoral areas without any randomization.

2. The empowerment scales used were arbitrary and lacked scientific basis. The scales assume equal contribution by all the empowerment factors. Indeed the authors stated that this was done for easy analysis. This introduces bias in the development of the scales. Use of principal component analysis could have been more appropriate.

3. It is not clear whether only the sampling frame of the FHWS in Asawase was used for the study or the sampling frame of the FHWS in Asawase and Oforikrom were used.

4. The cut-off scores for empowerment (dichotomous variables) were arbitrary and not based on any scientific reason.

5. The method of analysis was poorly described. The authors stated that "bivariate regression
analyses were run to investigate the relationship between contraceptive use, categorical and continuous independent variables". The categorical and continuous independent variables used in the analysis were not described. At some point, the authors also referred to the chi square test as multivariate analysis.

Discussion
The discussion was poorly done. The findings were not discussed in the context of what already existed. Also, important policy questions that the results raised were not discussed at all.

**Is the work clearly and accurately presented and does it cite the current literature?**
Yes

**Is the study design appropriate and is the work technically sound?**
Yes

**Are sufficient details of methods and analysis provided to allow replication by others?**
No

**If applicable, is the statistical analysis and its interpretation appropriate?**
Partly

**Are all the source data underlying the results available to ensure full reproducibility?**
No

**Are the conclusions drawn adequately supported by the results?**
Yes

**Competing Interests:** No competing interests were disclosed.

**Reviewer Expertise:** Reproductive and child health, family planning, Health policy

I confirm that I have read this submission and believe that I have an appropriate level of expertise to state that I do not consider it to be of an acceptable scientific standard, for reasons outlined above.

Reviewer Report 12 August 2019

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Summary
This study is focused on assessing the relationship between women's empowerment and contraceptive use in an urban area of Ghana. The city of Kumasi is the second largest city in Ghana, with a rapidly growing population of rural migrants and continuing high rates of fertility. Nearly all population growth in Ghana is urban. Rural research has consistently showed that gender relations, spousal communication, and empowerment are critical determinants of contraceptive use. Yet, studies of these relationships in urban Ghana remain under-emphasized. For this reason, the focus of this paper represents a potentially important matter for national policy.

Introduction
The problem and supporting literature are reviewed and well documented. This reviewer has no further comment, apart from noting that this element of the paper is thorough.

Method
There are two serious methodological limitations of the paper.

○ Sampling. The authors do not explain why four clusters were selected, whether their section was randomized, or any information on the communities chosen. Are these informal settlements that were purposefully chosen? Or, is the sample intended to be representative of the population of Kumasi. At one point, the authors note that the frequency distribution for the dependent variable is different from the corresponding rate reported by the national DHS. But, the urban DHS results are quite different from rural results. The reader is left without an explanation of the comparison that is being made.

○ Scaling. Empowerment is defined by eliciting survey responses on 12 indicators, each of which is assumed to contribute equivalently to an overall index that ranges from 0 to 12. This is an unconventional procedure for generating an index. Since the variance associated with each indicator is unique, a summing approach should use standard scores to avoid bias. But, more importantly, scaling in socio-economic research typically uses “principal components analysis” methods that generate a continuous normally distributed index with a mean of zero and a standard deviation of one. Users of PCA indexes often group data into quintiles or some other representation of the normally distributed index. This procedure avoids the bias that could arise from the dominance of one or two of the indicators in the calculation of a scale. And, the procedure provides an objective basis for data reduction, with the possibility that the 12 indicators would be represented by a single index. This procedure is available in STATA or SPSS or R and is widely cited in the social science literature. It is important to embrace conventional scaling methods for this analysis, as results are subject to challenge.

○ The model. An alternative to scaling the indices would involve estimating the logit model with 11 dummy variables (allowing a high frequency indicator to be the reference class). This would permit assessment of the relative net contribution of each separate indicator of empowerment to the explanation of contraceptive use. Or, such a strategy could be employed as a supplement to the scaling approach described above.

There are some less critical limitations of the paper:

○ There is no limitations section.

○ While the results are presented as a definitive demonstration of the importance of
empowerment, the authors leave the reader a bit unclear about the policy or action implications of the results.

- National policy for the provision of contraception is not discussed. How are respondents provided with care? Is this an NGO initiative or is the provision of services related to government activities. Responding the empowerment results of this paper would require service provider utilization of findings. The audience for this research is unclear.

**Is the work clearly and accurately presented and does it cite the current literature?**
Yes

**Is the study design appropriate and is the work technically sound?**
Partly

**Are sufficient details of methods and analysis provided to allow replication by others?**
Partly

**If applicable, is the statistical analysis and its interpretation appropriate?**
No

**Are all the source data underlying the results available to ensure full reproducibility?**
No

**Are the conclusions drawn adequately supported by the results?**
Yes

**Competing Interests:** No competing interests were disclosed.

**Reviewer Expertise:** Demography, statistics, health systems research

I confirm that I have read this submission and believe that I have an appropriate level of expertise to state that I do not consider it to be of an acceptable scientific standard, for reasons outlined above.