

Extended Abstract

Examining community-level influences on uptake of modern contraceptive methods among youths in sub-Saharan Africa

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Introduction

Contraceptive uptake among youths in sub-Saharan Africa (SSA) remains low, even for methods such as condoms where the data indicate a substantial increase in uptake. There are significant disparities in contraceptive prevalence across SSA, and these disparities occur in tandem with a skewed contraceptive method mix. While the majority of countries in SSA have achieved significant gains demographic indicators such as school attainment for women, age at first marriage and age at first birth, the prevalence of early sexual debut (before age 18) has either stagnated or increased in a number of countries. Unmet need for contraception remains highest among youths and youths are more also likely to discontinue a contraceptive method or experience contraceptive failure, compared to older women. Together, these findings highlight the persisting vulnerability of African youth to unplanned and/or unwanted pregnancies, which impact their health, schooling and employment opportunities, thus impairing development of their full capabilities. Indeed, studies have highlighted the disproportionate burden of abortions and abortion-related complications among youths in SSA (Bearinger, Sieving, Ferguson, & Sharma, 2007; Patton et al., 2009).

Promoting the sexual and reproductive health (SRH) of youths in SSA requires in-depth understanding of the socio-ecological factors that facilitate or inhibit contraceptive uptake among in this population. The majority of past studies on contraceptive use in SSA have focused largely on individual and household factors e.g. parity, household income, number of living children, lack of knowledge, fear of side effects, and social and familial disapproval (Gakidou & Vayena, 2007; Stephenson, Baschieri, Clements, Hennink, & Madise, 2007). A few other studies have explored the role contextual factors such as geographical (e.g. access to services) and facility-related factors (e.g. quality of health services, and supply management) (Hong, Montana, & Mishra, 2006). The increasing recognition of the need for multi-systemic approaches to health and advances in multi-level modeling has spurred interest in community level factors, although these have been less widely explored. The studies have identified community demographic factors, fertility norms, gender norms and inequities and health knowledge in shaping uptake to modern contraceptive uptake as key ecological influences on contraceptive uptake (Elfstrom & Stephenson, 2012; Stephenson et al., 2007; Stephenson, Beke, & Tshibangu, 2008).

Identifying the relevant community influences for contraceptive uptake among youths in SSA is critical for developing contextually relevant community-level interventions to promote the SRH of youths in SSA. This paper seeks to expand the current literature on contraceptive uptake among youth in SSA, by identifying the contextually relevant community level factors associated with modern contraceptive use in this population. These data are particularly critical for health programming given the rapidly expanding youth population across SSA and the deleterious effects of poor SRH outcomes on youth

opportunities and capabilities. Utilizing nationally representative Demographic and Health Survey data, this paper examines the role of community demographics, fertility norms, gender norms and inequity, economic prosperity and health capital on contraceptive uptake among youths (aged 15 – 24 years) in SSA.

Methods

We utilized nationally representative Demographic and Health Survey (DHS) data from 25 countries in SSA, to examine the community factors associated with modern contraceptive methods use among youths. These countries were selected based on the criteria that the country had at least two surveys conducted between 1999 and 2014, in order to relative changes the significance of these community level factors on modern contraceptive methods over time. The time 1999-2014 was chosen based on availability of data to compute the community-level factors of interest to this study. For example, measures of household decision-making, intimate partner violence and HIV-knowledge were not consistently collected as part of the core DHS questionnaire until 1999 (DHS phase III). To facilitate cross-country and multi-survey comparisons, we selected a time frame when all these data would be available for all country surveys. For countries with more than two surveys in this time period, all surveys were included in the analysis. Our analyses include youths irrespective of their marital status or sexual status (i.e. currently sexually active or not) because contraceptive use is higher among sexually active unmarried youths compared to married youths (Blanc, Tsui, Croft, & Trevitt, 2009) so selecting only married youths would exclude a significant proportion of youths who are using contraceptives.

Measures: The primary outcome of this study was current use of any modern contraceptive method. In computing the community level factors, the primary sampling unit (PSU) was utilized as the proxy representation of a community since DHS surveys do not include any other community level variable. The PSUs consist of approximately 30 households. Analyses controlled for respondents' place of residence to account for potential differences in the construction of PSUs in urban and rural areas, as PSUs in rural areas may be closer approximation of the actual community compared to urban areas where the dense clustering of communities could result in artificial communities during demarcation of PSUs. Consistent with prior studies (Elfstrom & Stephenson, 2012; Stephenson et al., 2007; Stephenson et al., 2008), these community level factors were computed by averaging individual level data by respondents' PSU. The factors were computed using data for all female respondents aged 15 – 49 years at each survey. **Table 1** presents the operational definitions of the computed community level variables.

Although the community level influences on contraceptive uptake were the focus on these analyses, we controlled for individual and household level variables that have associated with modern contraceptive use in prior studies (i.e. Level 1 factors). These level I factors included age, sex, gender, level of education, current marital status, de jure place of residence, household wealth, exposure to mass media, living number of children, ideal number of children, working for pay, HIV knowledge, household decision-making and attitudes towards intimate partner violence scales. The community-level factors (Level 2 factors) included: *demographic factors* (i.e. gender composition of the community), *fertility norms* (age at marriage, age at first birth, age at sexual debut and ideal number of children); *gender*

norms and inequity (community household decision making autonomy index score, community violence justification index score, and proportion of women with secondary school education); *economic prosperity* (e.g. community household wealth index factor and exposure to mass media); and *health capital* (HIV knowledge and exposure to family planning messages).

Data analysis: Analyses were conducted for each country and survey individually, and all analyses incorporated the sampling weights. Univariate and bivariate analyses were conducted to examine the distribution of variables, and relationship between variables; highly correlated variables were not included in the same model. A multi-level modeling technique, which accounts for the hierarchical data structure was utilized. This strategy was deemed ideal because the women were clustering within PSUs during computation of community level factors violates the regression assumption of normality, which if ignored, could result in underestimation of standard errors of the odds ratios. Therefore, a multi-level logistic regression model was fit to examine the community level factors associated with modern contraceptive use for each country. All analyses adjusted for individual level factors (level I factors). To assess for potential macro-level trends, the results were stratified by region (based on the World Health Organization sub-region country grouping) and by current level of contraceptive prevalence, to create three categories: high CP (Zimbabwe, Namibia, Rwanda, Lesotho, Malawi, Congo-Brazzaville and Zambia), moderate CP (Ghana, Tanzania, Uganda, Ethiopia, Cameroon, Niger, Democratic Republic of Congo (DRC) and Burkina Faso), and low CP (Nigeria, Benin, Senegal, Mozambique, Liberia, Sierra Leone, Guinea and Mali).

Results

The overall proportion of variance explained by the community level factors varied across countries and year of survey, ranging from 0.008 in Zimbabwe (2006) to 0.938 in Niger (2006).

Community demographics: The *gender composition* of the community was significantly associated with lower odds for contraceptive use in Lesotho 2009 (OR = 0.687 (SE = 0.126); $p < .05$), Tanzania 2004 (OR = 0.602 (SE = 0.112); $p < .001$), and Liberia 2007 (0.386 (SE = 0.131); $p < .001$). It was significantly associated with greater odds for contraceptive use in and Sierra Leone 2008 (OR = 2.260 (SE = 0.817); $p < .05$). Overall, these findings suggest that youths living in communities with a lower ratio of living boys to living girls are less likely to use a modern contraceptive method.

Fertility norms: The *community mean age at marriage* was significantly associated with greater odds for contraceptive use in Lesotho 2004 (OR = 1.236 (SE = 0.098); $p < .001$), Uganda 2006 (OR = 1.172 (SE = 0.068); $p < .05$), Tanzania 2004 (OR = 1.237 (SE = 0.079); $p < .001$), DRC 2013 (OR = 1.152; SE = 0.079); $p < .05$), Nigeria 2013 (OR = 1.133 (SE = 0.079); $p < .05$), and Senegal 2010 (OR = 1.210 (SE = .094); $p < .05$). Mean age at marriage was associated with lower odds for contraceptive use in Mozambique 2003 (OR = 0.846 (SE = 0.063); $p < .05$). Overall, the findings suggest youths living in communities with a higher mean age at first marriage are more likely to utilize a modern contraceptive method.

The community *mean age at first birth* was significantly associated with lower odds for contraceptive use in Malawi 2010 (OR = 0.856 (SE = 0.057); $p < .05$), Zambia 2013 (OR = 0.795 (SE = 0.058); $p < .001$), Nigeria 2008 (OR = 0.809 (SE = 0.048); $p < .001$), Nigeria 2013 (OR = 0.865 (SE = 0.047); $p < .001$), Benin 2006 (OR = 0.787 (SE = 0.067); $p < .001$), and Guinea 2005 (OR = 0.770 (SE = 0.089); $p < .05$). It was associated with greater odds for contraceptive use in Zimbabwe 2011 (OR = 1.214 (SE = 0.109); $p < .05$). Overall, these findings suggest that the in communities where child bearing is delayed to a later age (after age 18), youths were less likely to use a modern contraceptive method.

The community *mean age at sexual debut* was significantly associated with lower odds for contraceptive use in Zimbabwe 2011 (OR = 0.815 (SE = 0.069); $p < .05$), Zambia 2007 (OR = 0.801 (SE = 0.078); $p < .05$), Tanzania 2004 (OR = 0.851 (SE = 0.060); $p < .05$), Ethiopia 2000 (OR = 0.661 (SE = 0.109); $p < .05$), DRC 2007 (OR = 0.690 (SE = 0.089); $p < .001$), Senegal 2005 (OR = 0.487 (SE = 0.107); $p < .001$), and Senegal 2010 (OR = 0.744 (SE = 0.089); $p < .05$). The mean age at sexual debut was associated with greater odds for contraceptive use in Kenya 2009 (OR = 1.190 (SE = 0.084); $p < .05$), Cameroon 2004 (OR = 1.266 (SE = 0.147); $p < .05$), and Niger 2006 (OR = 2.349 (SE = 0.895); $p < .05$). Overall, these findings suggest that the likelihood of contraceptive use among youths is lower in communities with a higher age at sexual debut (> 16 years). However, this trend is not true for Kenya (2009) and Ghana (2003), suggesting potential mediating effects of other unobserved factors.

Lastly, the community *ideal number of children* was significantly associated with lower odds for contraceptive use in Zimbabwe 2006 (OR = 0.782 (SE = 0.091); $p < .05$), Zimbabwe 2011 (OR = 0.744 (SE = 0.094); $p < .05$), Rwanda 2010 (OR = 0.582 (SE = 0.070); $p < .001$), Kenya 2003 (OR = 0.607 (SE = 0.075); $p < .001$), Kenya 2009 (OR = 0.666 (SE = 0.074); $p < .001$), Zambia 2007 (OR = 0.663 (SE = 0.069); $p < .001$), Zambia 2013 (OR = 0.736 (SE = 0.063); $p < .001$), Tanzania 2004 (OR = 0.874 (SE = 0.712); $p < .10$), Tanzania 2010 (OR = 0.712 (SE = 0.056); $p < .001$), Uganda 2001 (OR = 0.672 (SE = 0.083); $p < .001$), Uganda 2011 (OR = 0.728 (SE = 0.065); $p < .001$), DRC 2013 (OR = 0.795 (SE = 0.056); $p < .001$), Burkina Faso 2003 (OR = 0.525 (SE = 0.077); $p < .001$), Burkina Faso 2010 (OR = 0.722 (SE = 0.057); $p < .001$), Nigeria 2008 (OR = 0.980 (SE = 0.009); $p < .05$), Nigeria 2013 (OR = 0.654 (SE = 0.037); $p < .001$), Senegal 2010 (OR = 0.747 (SE = 0.101); $p < .001$), and Liberia 2013 (OR = 0.709 (SE = 0.069); $p < .001$). Overall, these findings suggest that youths living in communities with a higher desire for children (>4 children) are less likely to utilize modern contraceptive methods.

Gender norms and inequity: Community *household decision making autonomy* was significantly associated with lower odds of modern contraceptive use among youths in Malawi 2010 (OR = 0.912 (SE = 0.033); $p < .001$), Zambia 2007 (OR = 0.862 (SE = 0.047); $p < .001$), Ghana 2003 (OR = 0.885 (SE = 0.053); $p < .05$), Ghana 2010 (OR = 0.891 (SE = 0.047); $p < .05$), Uganda 2006 (OR = 0.878 (SE = 0.048); $p < .05$), and Senegal 2010 (OR = 0.691 (SE = 0.101); $p < .05$). These findings suggest that lower levels of community household decision-making autonomy are associated with less likelihood of modern contraceptive method use among youths.

The community *violence justification score* was significantly associated with lower odds of modern contraceptive use among youths in Congo Brazzaville 2005 (OR = 0.780 (SE = 0.077); $p < .05$), Zambia

2013 (OR = 0.932 (SE = 0.031); $p < .05$), Tanzania 2004 (OR = 0.908 (SE = 0.042); $p < .05$), and Nigeria 2013 (OR = 0.929 (SE = 0.022); $p < .001$). It was associated with greater odds for modern contraceptive use in Zimbabwe 1999 (OR = 1.251 (SE = 0.107); $p < .001$), Rwanda 2005 (OR = 1.117 (SE = 0.066); $p < .10$), Congo Brazzaville 2010 (OR = 1.216 (SE = 0.082); $p < .05$), Ghana 2008 (OR = 1.207 (SE = 0.062); $p < .001$), and Sierra Leone 2008 (OR = 1.094 (SE = 0.033); $p < .001$). Overall, these findings suggest that youths living in communities with a high justification for violence are less likely to use a modern contraceptive method.

The *proportion of women with secondary school education* was significantly associated with lower odds of modern contraceptive use in Zimbabwe 2006 (OR = 0.608 (SE = 0.056); $p < .05$), Zambia 2007 (0.334 (SE = 0.169); $p < .05$), and Tanzania 2004 (OR = 0.011 (SE = 0.017); $p < .001$). It was associated with higher odds of modern contraceptive use in Cameroon 2010 (OR = 6.020 (SE = 5.203); $p < .05$). Overall, these findings suggest that youths living in communities with lower proportion of women with a secondary school education are less likely to utilize modern contraceptive methods.

Health capital: The *community HIV knowledge score* was significantly associated with greater odds for contraceptive use in Rwanda 2010 (OR = 1.575 (SE = 0.335); $p < .05$), Zambia 2013 (OR = 1.331 (SE = 0.160); $p < .05$), Tanzania 2010 (OR = 1.667 (SE = 0.373); $p < .05$), Uganda 2011 (OR = 1.828 (SE = 0.346); $p < .001$), Ethiopia 2000 (OR = 1.671 (SE = 0.307); $p < .001$), Ethiopia 2005 (OR = 1.562 (SE = 0.313); $p < .05$), Cameroon 2004 (OR = 1.629 (SE = 0.264); $p < .001$), Sierra Leone 2008 (OR = 1.396 (SE = 0.179); $p < .001$), and Sierra Leone 2013 (OR = 1.324 (SE = 0.107); $p < .001$). It was also associated with lower odds for contraceptive use in Benin 2011 (OR = 0.696 (SE = 0.082); $p < .001$). Overall, these findings suggest that youths living in communities with high level of HIV knowledge are more likely to use a modern contraceptive method.

The *community family planning message exposure score* was associated with greater odds for contraceptive use in Zimbabwe 2006 (1.622 (SE = 0.297); $p < .001$), Lesotho 2009 (OR = 1.926 (SE = 0.547); $p < .05$), Tanzania 2004 (1.559 (SE = 0.321); $p < .05$), Ethiopia 2000 (OR = 2.517 (SE = 1.131); $p < .05$), DRC 2007 (OR = 3.295 (SE = 1.772); $p < .05$), DRC 2013 (OR = 2.687 (SE = 1.083); $p < .05$), Burkina Faso 2010 (OR = 1.425 (SE = 0.228); $p < .05$), Nigeria 2013 (OR = 1.252 (SE = 0.140); $p < .05$), and Mozambique 2003 (OR = 1.713 (SE = 0.367); $p < .05$). It was also associated with lower odds for contraceptive use in Kenya 2009 (OR = 0.685 (SE = 0.105); $p < .05$), Guinea 2005 (OR = 0.307 (SE = 0.122); $p < .001$), and Mozambique 2011 (OR = 0.653 (SE = 0.123); $p < .05$). Overall, these findings suggest that youths living with communities with greater exposure to family planning messages are more likely to use a modern contraceptive method.

Economic prosperity: Mean *community wealth index factor* was significantly associated with lower odds for contraceptive use Zambia 2002 (OR = 0.569 (SE = 0.130); $p < .05$); all other relationships were not statistically significantly.

The *community mass media exposure score* was significantly associated with lower odds for contraceptive use in Zimbabwe 1999 (OR = 0.850 (SE = 0.069); $p < .05$), Rwanda 2000 (OR = 0.752

(SE = 0.103); $p < .05$), Mozambique 2003 (OR = 0.841 (SE = 0.047); $p < .001$), and Guinea 2012 (OR = 0.687 (SE = 0.068); $p < .001$). It was associated with greater odds for contraceptive use in Namibia 2013 (OR = 1.114 (SE = 0.076); $p < .05$), Kenya 2003 (OR = 1.458 (SE = 0.095); $p < .001$), Malawi 2010 (OR = 1.071 (SE = 0.033); $p < .05$), Tanzania 2004 (OR = 1.165 (SE = 0.077); $p < .05$), Uganda 2001 (OR = 1.358 (SE = 0.134); $p < .001$), Cameroon 2010 (OR = 1.152 (SE = 0.049); $p < .001$), and Benin 2006 (OR = 1.149 (SE = 0.092); $p < .001$). Overall, these findings suggest increased exposure to mass media increases the likelihood of modern contraceptive use among youths.

Conclusion and Implications

In summary, our findings suggest that community level factors e.g. community demographics, fertility norms, gender norms and inequity, health capital and community economic prosperity influence uptake of modern contraceptive methods among youths. We found that the salience of these community-level factors varied across countries. The gender composition of the community was associated with contraceptive use in Tanzania, while the proportion of women with secondary school education was associated with contraceptive use in Cameroon and Tanzania. The mean age at first marriage was associated with contraceptive use in Malawi, DRC, Senegal, Benin and Nigeria. The mean age at first birth was associated with contraceptive use in Nigeria and Benin, while the mean age at sexual debut was associated with contraceptive use in Senegal. The ideal number of children was associated with contraceptive use in Zimbabwe, Kenya, Zambia, Burkina Faso, Nigeria, Mozambique, Uganda and Tanzania. The community HIV knowledge score was associated with contraceptive use in Ethiopia and Sierra Leone while the community exposure to family planning messages score was significantly associated with contraceptive use in the DRC and Mozambique. The community wealth index score and community exposure to mass media were not particularly salient in any particular country.

Of the several factors examined, we found that community fertility desires (mean ideal number of children), community household decision-making autonomy, and community mean ideal age at first marriage were the most influential factors, as they exerted influence on contraceptive uptake in a number of countries included in these analyses. However, our analyses did not identify any potential regional or demographic (i.e. contraceptive prevalence) trends or confluence of any set of factors. These findings underscore the relevance of community factors in promoting or hindering contraceptive uptake among youths in SSA. The variation in influence of the community-level factors across countries and survey phases could be attributed to several factors including the cross-sectional study design of DHS surveys as different communities are included in each survey phase, which may result in variations in relationships between community-level factors and contraceptive use given the huge cultural variations in SSA, even within countries. Additionally, this variation in significance of community level factors could be attributed to on-going demographic transitions, which may also influence the relationships between these community variables and contraceptive prevalence.

Together, these findings highlight the variation in community-level influences across SSA and underscore the relevance of targeted community level interventions to promote contraceptive uptake among youths in SSA. These findings also illuminate potential mechanisms through which the

community level factors could influence youth's contraceptive uptake. For example, the salience of fertility aspirations (i.e. ideal number of children) across multiple countries in these analyses highlights the relevance of cultural norms, especially around child-bearing. Additionally, the relevance of secondary school education and exposure to mass media suggests that health literacy may play an important role in promoting uptake of contraceptive uptake among youths. Our study findings also highlight potential leverage points for family planning programs e.g. increasing community exposure to contraceptive messages.

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Table 1: Operational description of community level variables	
<i>Community Demographics</i>	
Gender composition of community	Computed as the ratio of the number of living boys to the number of living girls in the community
<i>Fertility norms</i>	
Mean age at marriage	Mean age at marriage of women ages 15- 49 years in the community
Mean age at first birth	Mean age at first birth of women ages 15- 49 years in the community
Mean age at sexual debut	Mean age at first sex of women ages 15- 49 years in the community
Ideal number of children	Mean ideal number of children in the community
<i>Gender norms and inequity</i>	
Community household decision making autonomy index score	Mean score on the household decision-making autonomy index in the community. Household decision-making was computed from a five item scale assessing final say on respondents' own health care, making large purchases, household purchases for daily needs, visits to family or relatives, and food cooked each day. Responses are measured on a 5-point scale; a higher score indicates higher decision-making autonomy.
Community violence justification index score	Mean score on the violence justification index scale in the community. Violence justification was computed from a five item scale with responses measured on a 5-point scale; a higher score indicates higher decision-making autonomy. Items include: going out without telling partner, neglecting the children, arguing with partner, refusing to have sex with the partner, and burning food.
Proportion of women with secondary school education	Computed as the ratio of the proportion of men with a secondary school education to the proportion of women with secondary school education
<i>Economic prosperity</i>	
Community household wealth index factor	Computed as the mean wealth index factor score of the community.
Community exposure to mass media score	Computed as the mean score on three items assessing exposure to mass media: frequency of listening to radio, watching TV and reading newspapers. Responses are measured on a 3-point scale; a higher score indicates greater exposure to mass media.
<i>Health capital</i>	
Community HIV knowledge index score	Computed as a mean of a 7-item scale assessing HIV knowledge. Scale items include: one item on HIV awareness (ever heard of HIV/AIDS), three items about HIV risk reduction strategies (abstinence, consistent condom use, and having one with no other partners), and three items on HIV transmission (getting AIDS from mosquitoes, getting AIDS from sharing food with an infected person, and whether a healthy looking person can have AIDS). Responses are measured on a 3-point scale (yes/ no/ don't know). In these analyses, the option "don't know" was recoded into "No"). A higher score indicates high HIV knowledge.
Community exposure to family planning message index score	Computed as the mean score on three items assessing exposure to family planning messages on the radio, TV and newspapers. Responses are measured on a two point scale (yes/no), and a higher score indicates greater exposure to family planning messages.