

Insights on Family Health in Kenya

Further Analysis of Two Decades of Demographic
and Health Surveys 1989—2009

ICF International, Inc.
Calverton, Maryland, USA

May 2013



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Acknowledgement: Dedicated to the memory of Dr. Paul Lumula Kizito, beloved colleague, mentor, teacher, and friend, who passed away on November 24, 2012.

This study was carried out with support provided by the United States Agency for International Development (USAID) through the MEASURE DHS Project (#GPO-C-00-08-00008-00). The views expressed are those of the authors and do not necessarily reflect the views of USAID or the United States Government.

Recommended Citation:

National Council for Population and Development (NCPD). 2013. *Insights on Family Health in Kenya: Further Analysis of Two Decades of Demographic and Health Surveys 1998—2009*. Nairobi, Kenya: NCPD.

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Executive Summary

Francis Kundu
Paul Kizito¹
Vane Lumumba²

Corresponding Author: Francis Kundu, National Council for Population Development, Nairobi, Kenya. Email: fkundu@ncpd-ke.org.

¹ National Council for Population Development, Nairobi, Kenya. Email: pkizito@ncpd-ke.org.

² National Council for Population Development, Nairobi, Kenya. Email: vlumumba@ncpd-ke.org.

BACKGROUND AND OVERVIEW

Demographic and Health Surveys (DHS) have over the years gained importance as tools to monitor and evaluate population and health programmes in developing countries. The 2008-09 Kenya Demographic and Health Survey (KDHS), the fifth household-based survey to be conducted in Kenya, followed similar surveys performed in 1989, 1993, 1998, and 2003. The current survey collected information on sexual activity, fertility, family planning, maternal and child health, and sexually transmitted infections including, human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS). Specific objectives were as follows:

- To provide data at the national and provincial levels to be used to evaluate national population policy and programmes
- To measure changes in fertility and contraceptive prevalence use and to study factors that affect these changes
- To examine basic indicators of maternal and child health in Kenya
- To describe knowledge and behaviour related to transmission of STIs
- To estimate prevalence of domestic violence, female genital cutting, and HIV infection

Data for the survey were collected from a sample of 8,444 women age 15-49 and 3,465 men age 15-54. A total of 9,057 households were interviewed.

Following the dissemination of survey results in 2010, stakeholders recommended topics for further analysis. A better explanation and understanding of the results would enhance planning and implementation of population and health policies and programmes. The National Council for Population and Development coordinated this process, which involved bringing together stakeholders in February 2012 to agree on five priority areas for further analysis. Five teams, with three researchers each, were recruited through a competitive process to research and develop further analysis papers on the priority areas using data from previous KDHS surveys. These papers were developed between March 2012 and September 2012 in the areas of maternal and newborn health, family planning and fertility, child health, HIV/AIDS, and cross-cutting issues.

MAIN FINDINGS

A brief description of the purpose, methodology, and findings of each of the five analyses follows.

VITAMIN A SUPPLEMENTATION AND STUNTING AMONG CHILDREN AGE 2

Child nutrition is critical for economic productivity and development. Adequate nutrition plays a central role in human growth, human capital formation, and morbidity and mortality. Child undernutrition, a serious risk factor for ill health and mortality, contributes substantially to the burden of disease in developing countries. In Kenya, high levels of child undernutrition have

persisted over time. For example, the prevalence of stunting among children younger than age 5 has remained at 35 percent for several years.

Micronutrient supplementation can benefit the health of young children by improving their immune system response and providing adequate protection against infections. Vitamin A deficiency is estimated to cause more than half a million deaths worldwide among children under age 5. Kenya's policy on vitamin A supplementation has been to give all children age 6-59 months a supplement at 6-month intervals. However, the benefit of vitamin A supplementation on the nutritional status of children in Kenya has never been established. This study therefore sought to determine the potential effects of vitamin A supplementation on the growth of children in Kenya, with a specific focus on children age 2 because this age group has the highest level of stunting in the country.

Methods

The primary outcome measure of interest in the analysis was stunting, while secondary outcome measures included wasting and underweight. The key independent variable of interest was vitamin A supplementation. Children who had received vitamin A supplementation since age 6 months and children who had never received vitamin A supplementation were compared. Other variables of interest in the analysis included important child, maternal, and household risk factors.

Child risk factors included age, sex, birth order, perceived birth size, deworming status, morbidity status (in the two weeks preceding the survey), and duration of breastfeeding. *Maternal risk factors* were age at birth, marital status, education level, nutritional status, and work status. Risk factors at the *household level* were urban/rural residence, region/province, socioeconomic status, drinking water source, toilet facility type, and number of children less than age 5 in the household.

The analysis involved 1,029 children age 24-35 months (2 years) whose anthropometric measurements (weight and height) were taken. Bivariate and multiple logistic regression analyses were conducted with the outcome variables (stunting, underweight, and wasting) and with vitamin A supplementation and other explanatory variables at the child, maternal, and household levels, respectively. Statistical significance was determined at the 95% confidence interval.

Results

The study found that among children age 2, the prevalence of stunting was 46 percent, the prevalence of underweight was 20 percent, and the prevalence of wasting was 6 percent. The prevalence of vitamin A supplementation in the study group was 78 percent. The vitamin A supplementation status of children was significantly associated with undernutrition after controlling for other risk factors at the child, maternal, and household levels. The odds of stunting were 50 percent higher among children who had never received any vitamin A compared with children who had received vitamin A. Additionally, the odds of underweight were 75 percent higher among children who had never received vitamin A compared with those who had received vitamin A.

WOMEN'S EMPOWERMENT AND UNMET NEED FOR FAMILY PLANNING

An estimated 150 million women worldwide want to delay or avoid pregnancies while not using any family planning method. In Kenya, unmet need for family planning rose from 24 percent in 2003 to 26 percent in 2008, suggesting that a growing proportion of married women are having more children than they would like. Women who have access to family planning are better able to prevent unintended pregnancies and unwanted births, achieve education and employment goals, increase family incomes, and contribute to development.

Various studies have shown the extent of unmet need and have attempted to explain why women who do not want to become pregnant fail to use contraception. Reasons for non-use vary from concerns about contraceptive methods themselves (side-effects) and quality of service delivery to socioeconomic and sociocultural factors. Considerable research links unmet need for family planning with women's socioeconomic characteristics: age, education, residence (rural or urban), household wealth, and employment status. However, few studies have focused on gender-related social and cultural obstacles arising from predominantly patriarchal family systems in sub-Saharan Africa. These systems also prevent women from realizing their desired fertility preferences.

In most cases, men have greater decision-making power than women over childbearing preferences. Research findings have suggested that empowering women and increasing their ability to make decisions may influence uptake of reproductive health services. Such reproductive health services, which include family planning and maternal health care, ultimately influence the quality of health for women and their families. This analysis sought to determine if an association exists between indicators of women's empowerment and unmet need for family planning among currently married women in Kenya.

Methods

The dependent variable of the study was unmet need for planning. The independent variables were the four indicators of women's empowerment: employment and mode of payment, women's participation in household decision-making, husband's or partner's controlling behaviors, and experience of spousal violence. The first step of the analysis involved a description of the background characteristics of the respondents. Cross-tabulations with Pearson's chi-square test were performed to check the significance of the association of unmet need with background characteristics and women's empowerment indicators. Logistic regression was used to predict the odds of women experiencing unmet need for family planning when exposed to different empowerment variables, while controlling for the selected background characteristics.

Results

Overall, the results of the chi-square test revealed a statistically significant association between the empowerment indicators and unmet need for family planning. However, when all indicators of women's empowerment were included in the logistic regression model, the only variable that displayed a statistically significant association after controlling for background

characteristics was employment/mode of payment. Compared with women who did not work in the year preceding the survey, those who worked but who were not paid had a 37 percent lower odds of having unmet need for family planning. Women who were paid in kind only or both in cash and in kind were 55 percent less likely to have unmet need compared with those who did not work. Among women who worked and were paid in cash only, their odds of having unmet need for family planning were 28 percent lower than those of women who did not work.

When the controlling behavior by husbands/partners was removed from the model, women's experience of spousal violence emerged as a significant predictor of unmet need for family planning. This finding not only confirms the hypothesized link between spousal violence and unmet need but also indicates a possible relationship between husbands' controlling behaviors and women's experience of spousal violence. Although equity in household decision-making is associated with positive outcomes in various spheres, including health, this study did not find any statistically significant association between the number of household decisions a woman makes and unmet need for family planning.

ASSOCIATION BETWEEN GENDER-BASED VIOLENCE AND HIV INFECTION AMONG MARRIED WOMEN

An increase in the prevalence of gender-based violence (GBV) has been widely reported in both developed and developing countries. In Kenya, the 2008-09 KDHS showed that 47 percent of married women have experienced some kind of violence from their spouses/partners. Of public health concern is the concurrence of GBV and HIV infection. It has been suggested that GBV may be associated with HIV infection via several mechanisms, including violent intercourse and inability to negotiate for safer-sex practices. However, conflicting evidence has been reported on the association between GBV and HIV infection. While a few studies have shown an association between GBV and HIV infection, population-level data from 10 low-to-middle income countries suggest otherwise. Study design and methodological differences have limited the extent to which comparisons can be made among these studies. This study therefore sought to describe the association between GBV and HIV infection among married women of reproductive age in Kenya. Specifically, the study aimed to describe the association between individual components of GBV (physical, sexual, or emotional violence) and HIV infection.

Methods

HIV test results were taken as the main outcome variable, while GBV was considered to be the primary exposure variable. The study defined GBV as physical, sexual, or emotional violence perpetrated against the respondents by their husbands. Physical violence consisted of being pushed or shaken, slapped, punched, kicked, dragged, choked, burnt, attacked with a weapon, or having an arm twisted. Sexual violence consisted of either being forced to have sexual intercourse or to perform sexual acts against one's will. The study considered participants to have been emotionally violated if their husbands humiliated them in front of others, threatened to harm them, or insulted them. Any woman who had ever experienced any form of physical, sexual, or emotional violence from their current husband was considered to have experienced GBV.

For the sampled women, age, level of education, occupation, contraceptive use, wealth index, type of marriage (monogamous or polygynous), place of residence (rural or urban), and spousal alcohol consumption were considered to have a potential confounding effect on the association of GBV with HIV infection. The overall prevalence of HIV infection was a percentage determined by dividing the number of participants with HIV-positive test results by the total number of women included in the study population. Sub-population prevalence of HIV infection was also determined for the various forms of GBV. Multivariate logistic regression models, accounting for the survey design, were built to control for potential confounders and to describe the net effect of physical, sexual, emotional, and other forms of GBV on HIV infection.

Results

Of the 1,789 women who were tested for HIV and sampled for the domestic violence module, 792 (44.3%) had ever experienced some form of GBV. Physical violence was the most prevalent (33.6%) type, followed by emotional violence (28.4%) and sexual violence (13.8%). Among study participants, the HIV prevalence was 6.9 percent. In the univariate analysis, physical violence showed an association with HIV infection ($p=0.005$). In the multivariate analysis, however, only weak evidence of an association was observed between physical violence and HIV infection ($p=0.093$). Polygyny and geographic region negatively confounded the effect of physical violence on HIV infection. The results of multivariable analysis also showed little evidence of an association between emotional ($p=0.956$), sexual ($p=0.766$), or any other form of GBV ($p=0.372$) and HIV infection. Wealth, polygyny, and non-barrier methods of contraception were associated with HIV infection, even after adjusting for potential confounders.

REGIONAL VARIATIONS IN THE USE OF MODERN CONTRACEPTION: COMPARISON OF NYANZA, COAST, AND CENTRAL PROVINCES

Although contraceptive use throughout Kenya has increased over the years, substantial regional differences have persisted. The 2008-09 KDHS showed that, while the prevalence of modern contraceptive use in Central and Nairobi provinces is comparable to that in developed countries, contraceptive use is extremely low in North Eastern province—only 3 percent among married women. Explanations for these differences among provinces have been suggested: namely, socioeconomic and cultural factors as well as the impact of family planning programs on demographic variables, specifically, desire for more children and knowledge of family planning. Evidence from research conducted in Kenya and elsewhere has provided empirical evidence to support these suggestions. This study investigated the regional variation in modern contraceptive use in Kenya by focusing on Coast, Nyanza, and Central provinces. The three provinces differ substantially in how married women use modern contraceptive methods. Central province has the highest contraceptive prevalence, at 63 percent, while Nyanza and Coast provinces have much lower rates, at 33 percent and 30 percent, respectively. This study analyzed the socioeconomic, cultural, and demographic factors that may have contributed to the observed differences in contraceptive use in the three regions. The hypothesis used was that the differences in these factors within the three regions would explain the variation in levels of modern contraceptive use.

Methods

Both bivariate and multivariate analyses were performed. Bivariate analysis was performed through cross-tabulation to provide comparative associations at the regional and national level between modern contraceptive use and socioeconomic, cultural, and demographic variables as well as other intervening variables. Multivariate analysis was performed using logistic regression. Four logistic regression models, one for each of the regions and one for the national level, were fitted, and the effects of the variables were compared. Both religion and family planning knowledge variables were excluded from the regressions. In Central and Nyanza regions, which are predominantly Christian, the samples included few Muslims. Furthermore, estimates based on models that excluded this variable at the national and Coast province levels were similar. The knowledge variable was excluded because the results would have been difficult to interpret, as the effects could be in either direction. On one hand, women could be expected to use contraception because of their knowledge of family planning methods; on the other hand, women with family planning knowledge could have obtained this knowledge when they sought family planning services.

Results

Logistic regression, which shows associations after controlling for other factors in the model, indicates that socioeconomic and cultural factors are significantly associated with contraceptive use at the national level. Use of contraception increases with the level of woman's education, and the same trend is observed with the level of wealth. Contraceptive use is also higher among women in monogamous marital unions. In addition, after controlling for the effects of other factors in the model, the intervening variables are significantly associated with contraceptive use at the national level. Women who do not desire another birth are more likely to use contraception. Contraceptive use is higher among women who did not experience a child's death in the five years before the survey compared with those who did. Use of contraception is highest among women age 25-34 and among those with two or three children. Living in an urban area of Kenya, however, is not associated with higher use of contraception. This unexpected finding, although inconsistent with results of earlier DHS studies that suggest lower fertility and higher contraceptive use in urban areas, is consistent with the other unexpected finding from this study, which showed that infant mortality is higher in urban areas than in rural areas.

Logistic regression results at the regional level, however, show that these associations are not as strong. In Central region, where the level of contraceptive use is comparable to that in developed countries, contraceptive use is only associated with a woman's education, type of marriage, and age. Contraceptive use is high among women with a secondary education compared with those who have no education or primary education. It is higher among women in monogamous unions compared with women in polygamous unions, and also higher among women age 35 or older compared with women age 15-24. In Nyanza province, contraceptive use is only associated with a woman's education and fertility preferences. In Coast province, contraceptive use is only significantly associated with number of living children, and use is highest among women with two or three children.

DETERMINANTS OF POSTNATAL CARE USE

About 500,000 women around the world die each year from pregnancy-related complications. Sixty percent die within 48 hours of delivery, mostly in developing countries. Access to high-quality postnatal care (PNC) provided by skilled attendants improves maternal health and reduces adverse pregnancy outcomes. Despite the high level of antenatal care (ANC) in Kenya (92%) and widely available ANC services, PNC utilization in Kenya is still quite low. Therefore, the aim of this study was to identify the determinants of PNC use in Kenya.

Methods

From the nationally representative data of the 2008-09 KDHS, a sample of 3,973 women of reproductive age who reported having a live birth in the five-year period preceding the survey was selected. The data were then analyzed using logistic regression. The variables of interest were grouped into categories of sociodemographic factors, maternal and child characteristics, and service delivery.

Results

Overall, 47 percent of the women had received PNC services. The majority were age 20-29 at the birth of their last child, were married or living together, and resided in rural areas. Over 90 percent of these mothers reported receiving ANC at least once, and 52 percent of them delivered at home. The age of the mother at birth of her last child, level of education, place of residence (rural or urban), region of residence (province), number of ANC visits, skill of ANC provider, place of delivery, and skill of delivery provider were found to be the determinants of PNC use.

RECOMMENDATIONS

The following recommendations are based on results of the further analyses just described.

CHILD HEALTH

The prevalence of stunting in Kenya among children under age 5, particularly among those age 2, is worrying. The low coverage of vitamin A supplementation, only 30 percent among children age 6-59 months, is also of great concern, given that it is freely available for all children in this age cohort. Vitamin A supplementation among children age 3 to 5 is currently being maximized through its provision at early child development centres. However, children age 2 are being neglected. These children are not captured for intervention in development centres because they have not attained the admission age, and they are rarely captured in primary health facilities because most have completed the immunization schedule. Instead they are found at home with those age 1 who have just completed their primary immunizations. There is need to find innovative and effective ways of reaching this age group. We recommend task sharing in vitamin A supplementation. Supplements should be given by community health workers who are in regular contact with children in the community.

FAMILY PLANNING

Continued progress in socioeconomic development, abandonment of traditional practices, and reduction of infant and child mortality would promote the level of contraceptive use at the national level and also reduce regional differences in contraceptive use. In particular, the study data suggest that differences in contraceptive use among the three provinces could be narrowed by increasing the level of education in Coast province and by overcoming traditional practices such as polygyny in both Nyanza and Coast provinces. The observation that urban areas in Kenya may no longer provide a better environment for contraceptive use than rural areas suggests the need for further research to understand what could be responsible for this apparent reversal.

GENDER-BASED VIOLENCE AND HIV

This study suggests poor evidence of an association between GBV and HIV infection among married women in Kenya. The lack of an association between GBV and HIV suggests that these two public health concerns may be addressed independently at the policy level. However, due to the cross-sectional nature of this study and its inability to conclusively delineate the association between GBV and HIV infection, more studies are needed, preferably longitudinal in nature. The findings also highlight the need to further explore the association of wealth, polygyny, and nonbarrier contraceptive use with HIV infection.

MATERNAL HEALTH

The use of postnatal care (PNC) services in Kenya is low. The key determinants of PNC use identified as amenable to program intervention are skill of antenatal care provider, place of delivery, and skill of delivery provider. It is therefore recommended that maternal health programs promote the use of PNC services and facilitate the provision of high-quality services by skilled providers in approved health facilities.

CROSS-CUTTING ISSUES

National programmes aimed at reducing unmet need for family planning must also do the following:

- Address the economic dimension of women's empowerment by expanding employment opportunities for women.
- Scale up programmes aimed at reducing gender disparities in educational attainment, so as to increase chances for women in paid employment.
- Target interrelationships at the family level, with the aim of improving spousal relations and communication. Improvement in spousal communication will not only enhance collective decision-making among couples in relation to family health and family planning but will also help to reduce incidence of spousal violence.
- Encourage programme managers to create innovative strategies for enhancing men's involvement in family health, including family planning.

CONCLUSION

Kenya's development blueprint, popularly known as Vision 2030, aspires to achieve a high quality of life for all citizens. Health has been identified as one of the main social factors that will significantly contribute to a high quality of life. The five further analysis papers presented here highlight policy and programme gaps that need to be addressed to improve Kenya's population and health indicators. This calls for stakeholders to address the identified gaps so that the country can move towards achieving the aspirations of Vision 2030.

Vitamin A Supplementation and Stunting Levels among Two Year Olds in Kenya: Evidence from the 2008-09 Kenya Demographic and Health Survey

Elizabeth W. Kimani-Murage

Crispin Ndedda¹

Katherine Raleigh²

Peninah Masibo³

Corresponding Author: Elizabeth W. Kimani-Murage, African Population and Health Research Center, Nairobi, Kenya, P.O. Box 10787, 00100, Nairobi, Kenya. Email: ekimani@aphrc.org, lizmurage@gmail.com; Phone: +254 724322193; Fax +254(020) 4001101.

¹ Micronutrient Initiative, Nairobi, Kenya.

² US Agency for International Development (USAID), Nairobi, Kenya.

³ Department of Epidemiology and Nutrition, School of Public Health, Moi University, Nairobi Campus, Nairobi, Kenya.

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ABSTRACT

BACKGROUND

High levels of undernutrition, particularly stunting, have persisted in Kenya, like in other developing countries. The relationship between vitamin A supplementation and growth of children in Kenya has not been established, while there are context-specific variations on the relationship. This study explores this relationship in the Kenyan context.

METHODS

The study uses data from the 2008-09 Kenya Demographic and Health Survey, involving children aged 24-35 months, a weighted sample of 1029 children. Descriptive and logistic regression analyses were conducted. The outcome variable of interest is stunting, while the exposure variable of interest is ever receiving a dose of vitamin A supplement. Secondary outcomes include underweight and wasting status.

RESULTS

The prevalence of stunting in the study group was 46%; underweight 20%; and wasting 6%. The prevalence of ever receiving vitamin A supplement was 78%. Receiving vitamin A supplement was significantly negatively associated with stunting and underweight status, adjusting for other co-risk factors. The odds of stunting were 50% higher ($p=0.038$), while for underweight were 75% higher ($p=0.013$) among children who did not receive Vitamin A supplement compared with those who did.

CONCLUSION

This study demonstrates that receiving vitamin A supplement may be beneficial to growth of young children in Kenya. However, though freely offered through immunization services to children 6-59 months, some children do not receive it, particularly after completing the immunization schedule. There is need to establish innovative and effective ways of maximizing utilization of this intervention, particularly for children who have completed their immunization schedule.

INTRODUCTION

Childhood undernutrition remains a pervasive public health problem in the developing countries. It is associated with adverse short-term and long-term effects. It is a serious risk factor for ill health, associated with increased morbidity and mortality, and contributes substantially to the burden of disease in the developing countries [1-3]. Undernutrition, particularly stunting is also associated with compromised cognitive development and future economic productivity; and higher risk of metabolic diseases later in the life course [4-6]. The Millennium Development Goals (MDGs) prioritize reduction in undernutrition worldwide, however, young children are often vulnerable to undernutrition and its consequences, including stunting, underweight and wasting, which are prevalent in many low-income countries worldwide. In particular, estimates

of stunting for children under the age of five are greatest in Africa, with East Africa carrying the highest burden, where close to 50% of young children in the region are afflicted [7]. In Kenya, the prevalence of stunting for children aged less than five years is 35% [8].

Infant and young child nutrition, including micronutrient supplementation, has gained much attention over the previous decades, in part due to an increase in the understanding of the health benefits of nutrition in the first 1000 days of life. Breastfeeding, supplemental feeding and micronutrient fortification practices can benefit the health of young children through improved immune system response and adequate protection against infections [9, 10]. Micronutrient deficiency, specifically vitamin A deficiency, is estimated to cause more than a half million deaths among children under age five [1]. It is clear that poor health conditions are the result of a multitude of factors including child nutrition and maternal and household characteristics [11]. The continued high prevalence of stunting, underweight, and wasting across East Africa, including Kenya, emphasizes the importance of distinguishing the specific determinants of poor health status. By fully identifying and understanding the key risk factors that influence child health, it is possible to guide national policy and to better meet the needs of children.

The focus of this study was to determine the potential effects of nutritional supplementation on the growth of children age 24-35 months in Kenya. Primarily, the effects of receiving vitamin A supplements on stunting status was explored, and secondarily the effect on wasting and underweight status of young children, using data from the 2008-09 Demographic and Health Survey (DHS) in Kenya. Several studies have looked at micronutrient deficiencies and health status, showing the benefits of vitamin A, iron, zinc and calcium [9, 10, 12, 13]. However, other factors in different environmental contexts also influence growth of young children, including breastfeeding practices, parasitic infections and childhood diseases [14, 15]. This complexity has resulted in inconsistent results regarding the effects of vitamin A supplementation on child growth in developing countries [16-18] and indicates the need for context-specific studies.

Therefore, the study's goal was to better understand the relationship between vitamin A supplementation and growth of children in the Kenyan context. Children were evaluated for stunting as a key outcome of interest. The analyses had the overarching goal to address the burden of poor health and thus inform policy so that the negative cycle of poverty that poor health status perpetuates can be broken. The emphasis on alleviating this public health problem is critical in Kenya and throughout East Africa, and the long-term benefits of policy decisions and actions taken to improve the health of young children should be based on the key determinants of malnutrition.

CONCEPTUAL FRAMEWORK

The conceptual framework (Figure 1), adapted from the UNICEF 1990 framework of causes of malnutrition [19] describes immediate and underlying causes of malnutrition. In this study, the focus was on the association of the immediate causes of malnutrition, specifically vitamin A supplementation, on nutritional status, particularly stunting, among children age two.

The effects of other immediate factors including duration of breastfeeding, deworming and child morbidity, and other co-risk factors at the child, maternal and household levels were controlled for.

DATA AND METHODS

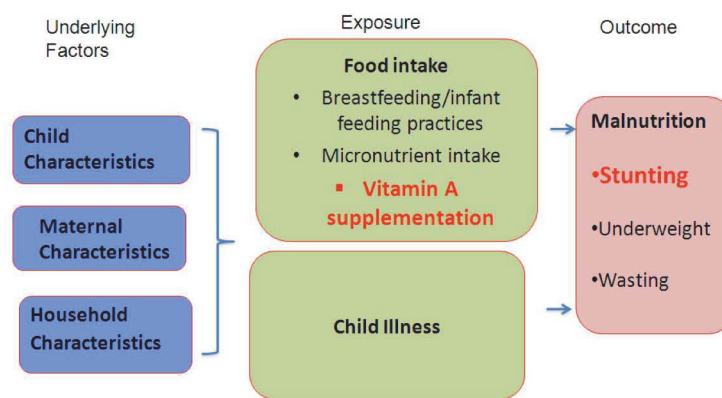
The study uses secondary data from the 2008-09 Kenya Demographic and Health Survey (KDHS). The Demographic and Health Surveys are nationally representative household surveys conducted in approximately 75 countries that provide data on a wide range of indicators including family planning, health and child nutrition. The 2008-09 KDHS was conducted by the Kenya National Bureau of Statistics in collaboration with government and non-government institutions. It covered 9,057 interviewed households, in which 8,444 women were interviewed.

The KDHS adopts a two-stage sampling design. The first stage involves selection of data collection clusters (enumeration areas). The second stage involves the systematic sampling of households from an updated list of households in each cluster. Regions with low population density are over-sampled, while those with high population density are under-sampled. Sampling weights are later applied to the data to obtain a nationally representative sample. All women age 15-49 who are either usual residents or visitors present in the households on the night before the survey are eligible to be interviewed in the survey.

This study analyzed data from the Kids Register (KR file). This file consists of records of interviewed de facto mothers (i.e. mothers who slept in the household the night before). Analysis involved children age 24-35 months whose anthropometric measurements (weight and height) were taken and were not considered erroneous (as detailed below). A sub-sample of 1,048 children age 24-35 months was filtered from the original sample of children aged below five years (unweighted N=6,079 children). To obtain nationally representative estimates, sampling weights were used. The final weighted sample included a total of 1,029 children age 24-35 months.

Figure 1

**Immediate and underlying causes of malnutrition among children in Kenya
(Adapted from UNICEF’s 1990 Framework of Causes of Malnutrition [19])**



ANTHROPOMETRIC MEASUREMENTS

All children below age five had their weight and length/height measured. These anthropometric measurements were taken by trained teams, consisting of two interviewers and one health worker. Weight was measured to the nearest 0.1kg using lightweight, bathroom-type scales with a digital screen designed and manufactured under the authority of UNICEF, and length/height was measured to the nearest 0.1 cm using a calibrated height board.

VARIABLES

Outcome Variables

The outcome measures for this analysis include stunting, wasting and underweight, defined here as a height-for-age z-scores (HAZ), weight-for-height z-scores (WHZ) and weight-for-age z-scores (WAZ) less than -2. The HAZ, WHZ and WAZ were generated using the World Health Organization's (WHO) 2006 growth standards [20]. Children with HAZ and WAZ from -5 and below and WHZ -6 and below were excluded from the analysis as they were considered to be extreme or incorrect. A total of 20 such cases were excluded from the analysis. The outcome variables were coded as "not stunted"/"stunted", "not wasted"/"wasted" and "not underweight"/"underweight" respectively.

Explanatory Variables

The key explanatory variable of interest was ever receiving vitamin A supplement. The Kenyan government policy on vitamin A supplementation requires that the supplement be given to all children from the age of six months up to 59 months, at six-month intervals. The 2008-09 KDHS determined vitamin A supplementation status among these children through information from the caregivers as well as verification from documentation on the child health cards. For this variable, children who had ever received a dose of vitamin A supplement and those who have never received the supplement were coded as "Yes"/"No" respectively.

Other explanatory variables in the analysis include important risk factors for undernutrition classified as child, maternal and household factors, as described below.

Child Factors

Child's age was analyzed as a continuous variable; child's sex was coded as "Female" and "Male"; birth order was coded as 1st, 2nd, 3rd, 4th and above; child's birth size as perceived by the mother was coded as "Average", "Larger than average" and "Smaller than average"; deworming status in the six months preceding the survey was coded as "Yes"/"No"; duration of breastfeeding in months was used a continuous variable in the regression analysis but coded as "24+ months", "0-5 months", "6-11 months", "12-18 months" and "18-23 months" in the descriptive analysis; child morbidity as reported by the mother including acute diarrhoea, fever and cough within the previous 24 hours for fever or within the two weeks preceding the survey for diarrhoea and cough. These were coded as "No"/"Yes".

Maternal Factors

Maternal variables included the age at birth of the child, coded as “under 20”, “20-24”, “25-29”, “30-34” and “35 and above”; marital status was coded as “In union” if married or cohabiting, and “Not in union” if never married, separated, divorced or widowed; maternal nutrition was measured by the body mass index –BMI, computed as weight in kilograms divided by the square of height in metres, and coded as “Normal BMI” (18.5-24.9), “Low BMI” (<18.5kg/m²) and “Overweight or obese” (BMI≥25kg/m²). Pregnant mothers and those two months postpartum were placed in a separate category. Maternal education was coded as “Secondary and above”, “No formal education”, and “Primary”; work status was coded as “Not working currently” and “Working currently”.

Household Factors

Household residence was coded as either rural or urban, while region was coded as Nairobi, Central, Coast, Eastern, Nyanza, Rift Valley, Western and North Eastern provinces. Household wealth index was used as an indicator of socioeconomic status based on household assets [21]. Each asset was assigned a factor score generated through principal components analysis. The resultant asset scores were standardized in relation to a normal distribution with a mean of zero and standard deviation of one. Each household was then assigned a score for each asset, and the scores were summed for each household. The wealth index was coded as “Lowest”, “Lower”, “Middle”, “Higher” and “Highest”. Other household factors included were: drinking water source, coded as “Improved” (including piped water, bottled water, tubewell/borehole and protected wells and springs) and “Unimproved” (including unprotected wells and springs, rain water and surface water sources); toilet facilities, coded as “Improved” (including water closets and ventilated improved pit latrines), “Unimproved” (including traditional pit latrines) and “No facilities” (including non-toilet faecal disposal methods mentioned in the survey such as bush and field); and number of children under age five living in the household, used as a continuous variable in the regression analysis but coded as “1”, “2” and “3 and above” in descriptive analysis. De facto children (children visiting the household at the time of the survey but who were not usual residents in the household) (n=14) were assigned drinking water source and toilet facility of the host household. Additionally, they were assigned the number of children under age five that live with their mother.

STATISTICAL ANALYSIS

Data analysis was undertaken using Stata version 11.1. For bivariate analysis, Pearson’s chi-square test was used to determine differences in proportions by background characteristics at the child, maternal and household levels. Multiple logistic regression was conducted with the outcome variables (stunting, underweight and wasting) and explanatory variables at the child, maternal and household levels as described above. A two-sided p-value of <0.05 was considered statistically significant. To account for the cluster sampling design, svyset commands in Stata were used, using pweights.

RESULTS

This study involves 1,029 children age 24-35 months, 488 girls (47%) and 541 boys (53%). The prevalence of stunting was the highest among the three nutritional indices, at 46%; prevalence of underweight was 20%; while prevalence of wasting was lowest, at 6%. The prevalence of ever receiving a dose of vitamin A supplement in the study group was 78%.

Table 1 shows the prevalence of stunting and other forms of malnutrition (underweight and wasting) by background characteristics for children age 24-35 months in Kenya. The results of the bivariate analysis indicate that ever receiving vitamin A supplement was significantly negatively associated with stunting ($p=0.004$). The prevalence of stunting was 56% among children who had not received vitamin A supplement compared with 43% among those who had received the supplement. Ever receiving vitamin A supplement was also significantly negatively associated with underweight ($p=0.002$), but not wasting.

Other factors with a significant association with stunting, underweight and wasting in the bivariate analysis level included perceived size at birth (for stunting and underweight), duration of breastfeeding (for wasting), morbidity from cough (marginal for underweight i.e. $p=0.056$), BMI status of the mother (marginal for stunting, i.e. $p=0.051$), maternal education (for all three indices), urban or rural residence (for stunting and underweight), region of residence (for wasting and underweight), wealth index (for all three indices), source of drinking water (for stunting and underweight), type of toilet facility (for all three indices), and number of children under age 5 living in the household (for wasting and underweight) (Table 1).

Table 1: Distribution of stunting, wasting and underweight among children age 24-35 months by vitamin A supplementation and other covariates at the child, maternal and household levels, (N=1,029), Kenya 2008

	Stunting (%)	Wasting (%)	Underweight (%)	Total (N)
Vitamin A supplementation				
Yes	43.1	6.1	17.4	807
No	55.9	7.4	28.6	222
P-value	0.004	0.537	0.002	
Other Risk Factors				
Child related characteristics				
Sex of child				
Female	42.5	5.6	19.5	488
Male	48.9	7.1	20.2	541
p-value	0.071	0.452	0.830	
Birth size				
Average	45.5	4.9	18.4	496
Larger than average	40.1	7.2	16.2	358
Smaller than average	58.5	8.9	31.3	175
p-value	0.007	0.236	0.006	
Birth order				
1 st	45.0	2.8	14.9	198
2 nd	48.9	7.3	23.5	210
3 rd	42.1	4.5	17.6	207
4 th plus	46.6	8.5	21.4	216
p-value	0.7672	0.163	0.340	
Duration of breastfeeding				
0-5 months	47.4	14.7	17.1	43
6-11 months	47.0	10.5	25.5	99
12-17 months	45.1	6.0	15.9	248
18-23 months	50.6	4.1	20.5	272
24+ months	41.6	5.5	19.7	357
Missing ¹	N/A	N/A	N/A	10
p-value	0.519	0.032	0.109	
Deworming status				
Yes	42.1	5.2	16.2	429
No	48.6	7.2	22.4	600
p-value	0.110	0.294	0.092	
Child morbidity²				
Acute diarrhea				
No	44.3	6.3	19.8	857
Yes	53.7	6.6	20.0	172
p-value	0.064	0.913	0.963	
Fever				
No	45.8	6.9	20.5	806
Yes	46.3	4.5	17.5	223
p-value	0.915	0.233	0.424	
Cough				
No	45.7	6.6	18.0	756
Yes	46.4	5.8	24.8	273
p-value	0.865	0.700	0.056	
Maternal characteristics Maternal age (at child's birth)				
Under 20	51.2	3.4	19.3	154
20-24	48.9	8.2	23.2	320
25-29	43.7	6.8	24.1	246
30-34	41.7	5.2	15.1	174
35+	42.0	5.9	10.8	135
p-value	0.542	0.508	0.108	
BMI				
Normal (BMI 18.5-24.9kg/m ²)	46.3	5.7	20	585
Low (BMI <18.5kg/m ²)	54.7	10.4	32.8	100
Overweight/obese (BMI≥25kg/m ²)	33.5	6.2	7.8	145
Pregnant and post-partum	49.2	6.4	21.7	200
p-value	0.051	0.433	0.646	
Marital status				
In union	46.1	6.6	20.3	895
Not in union	44.2	4.8	16.9	134
p-value	0.709	0.669	0.454	

Continued...

Table 1: —Continued

	Stunting (%)	Wasting (%)	Underweight (%)	Total (N)
Maternal education				
Secondary and above	30.9	2.8	6.8	230
Primary	50.8	6.2	23	684
No formal education	46.5	14.2	27.3	115
p-value	0.000	0.004	0.000	
Work status				
Not working currently	42.8	8.2	21.5	387
Currently working	47.7	5.2	18.8	642
p-value	0.205	0.129	0.500	
Household characteristics				
Residence				
Urban	35.2	3.5	9.7	159
Rural	47.8	6.9	21.7	870
p-value	0.027	0.185	0.001	
Region				
Nairobi	41.2	2.2	9.7	53
Central	41	4.8	11.8	90
Coast	56.7	12.9	28.7	78
Eastern	54.3	3.7	22.6	180
Nyanza	43.8	5.5	19.3	187
Rift Valley	46.3	9.1	24.7	256
Western	35.8	2.1	11.2	159
North Eastern	54.4	25	31.3	26
p-value	0.130	0.005	0.043	
Wealth index				
Lowest	53.3	11.7	26.7	265
Lower	51.9	3.2	27	239
Middle	44.4	4.9	16.7	209
Higher	37.5	7.3	14.0	160
Highest	34.8	3.2	7.5	156
p-value	0.012	0.016	0.000	
Source of drinking water³				
Improved ⁴	39.6	5.8	16.5	574
Unimproved ⁴	53.7	7.0	24.0	455
p-value	0.000	0.533	0.005	
Toilet facilities³				
Improved ⁵	36.4	4.0	11.8	372
Unimproved ⁵	47.6	6.0	20.8	460
No Facility	59.8	11.7	32.9	197
p-value	0.000	0.018	0.000	
No. of U5 children in household⁶				
1 child	38.9	3.4	12.6	338
2 children	45.7	6.7	25.2	446
3 and above	49.4	9.8	20.1	245
p-value	0.181	0.031	0.004	
Total	45.9	6.4	19.8	1,029

¹ N/A= Not applicable; results for missing cases not shown because n is too small (unweighted n is less than 25).

² Self-reported morbidity from diarrhoea, fever, or cough in the last two weeks before the survey.

³ Non-dejure defacto children in the household (n=14) were assigned the water source and toilet facility of the household they were living in.

⁴ Improved sources include piped water sources, tubewell/borehole, protected wells and springs, and bottled water; Unimproved sources include all other sources such as surface water and rain water.

⁵ Improved facility includes toilets with a flush to sewer, septic tank or to a pit latrine; no facility includes no facility/bush, flush to somewhere else; buckets, composting and hanging toilets.

⁶ Non-dejure defacto children in the household (n=14) were assigned the number of children under five years that live with their mother.

ASSOCIATION OF VITAMIN A SUPPLEMENTATION WITH STUNTING AND OTHER FORMS OF MALNUTRITION

As Table 2 shows, receiving vitamin A supplement remained significantly negatively associated with stunting even after adjusting for other co-risk factors at the child, maternal and household levels. The odds of stunting were 50% higher among children who had not received vitamin A supplement compared with children who had received the supplement ($p=0.038$). Additionally, the odds of underweight status were 75% higher among children who had not received vitamin A supplement ($p=0.013$).

CO-RISK FACTORS OF MALNUTRITION AT THE CHILD, MATERNAL AND HOUSEHOLD LEVELS

As shown on Table 2, at the child level, after adjusting for other factors, age of the child, perceived size at birth and reported morbidity in the last two weeks were significantly associated with either stunting, underweight or wasting ($p<0.05$). At the maternal level, only the education level of the mother was significantly associated with the nutritional status (stunting and underweight status, $p<0.05$). At the household level, region of residence, source of drinking water, type of toilet facility used by the household, socio-economic status and number of children under the age of five living in the household were all significantly associated with either stunting, underweight or wasting ($p<0.05$). However, these associations are beyond the focus of this study, and the inclusion of these co-risk factors in the models was mainly to control for their effects.

Table 2: Odds of stunting, wasting and underweight for all children age 24-35 months by vitamin A supplementation and other covariates at the child, maternal and household levels (N=1,029), Kenya 2008

	Stunting				Wasting				Underweight			
	Odds	p-value	95% CI (lower)	95% CI (upper)	Odds	p-value	95% CI (lower)	95% CI (upper)	Odds	p-value	95% CI (lower)	95% CI (upper)
Vitamin A supplementation												
Yes												
No	1.50	0.038	1.02	2.21	0.99	0.977	0.48	2.04	1.75	0.013	1.12	2.72
Other Risk Factors												
Child Level Factors												
Child Age (in months; continuous)	0.97	0.217	0.91	1.02	0.91	0.033	0.84	0.99	0.97	0.459	0.91	1.04
Sex of child												
Female												
Male	1.37	0.059	0.99	1.89	1.41	0.371	0.66	2.99	1.06	0.791	0.68	1.64
Birth size												
Average												
Larger than average	0.81	0.273	0.56	1.18	2.06	0.044	1.02	4.17	0.98	0.921	0.60	1.59
Smaller than average	1.74	0.019	1.10	2.75	2.36	0.031	1.08	5.16	1.96	0.012	1.16	3.30
Birth order												
1st												
2nd	1.05	0.883	0.54	2.06	1.16	0.802	0.36	3.80	1.26	0.484	0.66	2.43
3rd	0.86	0.635	0.46	1.62	0.79	0.717	0.22	2.83	0.88	0.75	0.41	1.90
4th plus	1.07	0.834	0.56	2.07	1.93	0.242	0.64	5.83	1.26	0.586	0.55	2.85
Breastfeeding duration (months)	1.00	0.724	0.97	1.02	0.98	0.52	0.92	1.04	1.01	0.548	0.98	1.05
Deworming status												
Yes												
No	1.24	0.219	0.88	1.75	1.53	0.268	0.72	3.23	1.30	0.302	0.79	2.14
Child morbidity												
Acute diarrhoea												
No												
Yes	1.33	0.240	0.83	2.15	0.72	0.522	0.26	1.97	0.79	0.521	0.39	1.61
Fever												
No												
Yes	0.99	0.985	0.58	1.72	0.56	0.197	0.23	1.35	0.56	0.077	0.29	1.07
Cough												
No												
Yes	0.86	0.473	0.57	1.30	0.80	0.571	0.37	1.75	1.88	0.014	1.14	3.11

Continued...

Table 2—Continued

	Stunting				Wasting				Underweight			
	Odds	p-value	95% CI (lower)	95% CI (upper)	Odds	p-value	95% CI (lower)	95% CI (upper)	Odds	p-value	95% CI (lower)	95% CI (upper)
Maternal Level Factors												
Maternal age (at child's birth)												
Under 20												
20-24	0.78	0.398	0.43	1.39	2.84	0.065	0.94	8.63	1.49	0.312	0.69	3.24
25-29	0.68	0.273	0.34	1.36	2.26	0.339	0.42	12.09	1.57	0.309	0.66	3.75
30-34	0.64	0.280	0.28	1.45	1.44	0.659	0.29	7.17	0.90	0.827	0.34	2.38
35+	0.60	0.232	0.26	1.39	1.65	0.557	0.31	8.77	0.53	0.276	0.17	1.67
BMI												
Normal (BMI 18.5-24.9kg/m2)												
Low (BMI <18.5kg/m2)	1.31	0.312	0.77	2.23	1.72	0.224	0.72	4.13	1.60	0.104	0.91	2.81
Overweight/obese (BMI≥25kg/m2)	0.77	0.291	0.47	1.26	1.71	0.401	0.49	6.02	0.52	0.161	0.21	1.30
Pregnant & post-partum	1.15	0.555	0.72	1.86	1.15	0.800	0.40	3.30	0.94	0.781	0.59	1.49
Marital status												
In union												
Not in union	1.02	0.935	0.63	1.65	0.86	0.829	0.22	3.42	1.07	0.817	0.61	1.88
Maternal education												
Secondary and above												
Primary	1.67	0.017	1.10	2.55	1.31	0.680	0.37	4.66	2.56	0.021	1.16	5.69
No formal education	0.61	0.197	0.29	1.29	1.15	0.878	0.20	6.67	1.36	0.594	0.44	4.20
Work status												
Not currently working												
Currently working	1.28	0.183	0.89	1.86	0.72	0.369	0.34	1.49	0.87	0.558	0.54	1.40
Household Level Factors												
Residence												
Urban												
Rural	1.33	0.347	0.73	2.43	2.11	0.183	0.70	6.33	1.14	0.746	0.52	2.46
Region												
Nairobi												
Central	0.47	0.113	0.18	1.20	1.44	0.788	0.10	20.76	0.41	0.290	0.08	2.16
Coast	0.81	0.671	0.30	2.16	3.31	0.352	0.26	41.41	0.92	0.909	0.23	3.71
Eastern	0.48	0.106	0.20	1.17	0.62	0.737	0.04	10.22	0.43	0.266	0.10	1.91
Nyanza	0.29	0.010	0.12	0.74	0.90	0.94	0.07	12.40	0.42	0.253	0.10	1.86
Rift Valley	0.38	0.033	0.16	0.92	1.70	0.677	0.14	20.59	0.59	0.471	0.14	2.46
Western	0.27	0.006	0.10	0.69	0.32	0.410	0.02	4.77	0.22	0.052	0.05	1.01
North Eastern	0.99	0.981	0.33	2.91	3.91	0.321	0.26	57.95	0.87	0.862	0.19	4.02
Wealth index												
Lowest												
Lower	1.10	0.703	0.68	1.76	0.35	0.048	0.12	0.99	1.26	0.455	0.69	2.32
Middle	1.13	0.685	0.63	2.03	0.79	0.682	0.25	2.49	0.96	0.915	0.44	2.08
Higher	0.99	0.974	0.51	1.94	1.17	0.815	0.31	4.41	0.84	0.700	0.33	2.09
Highest	0.88	0.774	0.37	2.10	0.71	0.731	0.10	4.97	0.43	0.152	0.13	1.37
Source of drinking water												
Improved												
Unimproved	1.42	0.046	1.01	2.02	0.80	0.539	0.39	1.64	0.99	0.962	0.65	1.51
Toilet facilities												
Improved												
Unimproved	1.27	0.260	0.84	1.92	1.81	0.317	0.56	5.81	1.26	0.546	0.59	2.69
No Facility	1.80	0.048	1.01	3.22	1.85	0.286	0.59	5.78	1.81	0.148	0.81	4.06
No. of U5 children in household	1.08	0.446	0.88	1.34	1.57	0.018	1.08	2.27	1.06	0.693	0.81	1.38
Total (N)		1,029				1,029				1,029		

DISCUSSION

This study set out to determine if there is an association between vitamin A supplementation and stunting among young children age two — the age group with the highest level of stunting in Kenya, according to the 2008-09 KDHS [8]. The study shows that receiving vitamin A supplement is significantly associated with children's growth. This suggests that vitamin A supplementation may be protective against stunting, or may reverse stunting [16, 22]. This is important given the negative consequences of stunting at an early age and the fact that vitamin A supplementation is a public health intervention in Kenya that is freely provided to children between the ages of six months and five years but that some children do not receive it.

The association between vitamin A and child growth has been documented in observational studies [16, 22]. This association is linked to several mechanisms including the

inverse relationship between vitamin A intake and incidence and severity of childhood infections, which may lead to growth faltering due to reduced nutritional intake, malabsorption of nutrients and increased nutrient expenditure during illness [23], and also the role of vitamin A in cell differentiation and function, therefore showing biological plausibility [24].

Despite this established relationship between vitamin A and child growth, studies regarding vitamin A supplementation and growth in developing countries have found inconsistent results [16-18]. For example, in a randomized controlled study among pre-school Indonesian children age 6-48 months, Hadi et al. (2000) found that vitamin A supplementation improved linear growth. This effect was age specific, higher among children age 24 months or older compared with children under age 24 months. Additionally, this effect was higher among children who were not breastfed and those who were deficient of vitamin A [16]. Another study, however, in a randomized controlled trial in Northern Ghana found no significant association between vitamin A supplementation and linear growth of children age three or older, despite substantial reduction in severe morbidity and mortality in the same group [17]. Some studies have suggested that the inconsistencies are due to the effect of other factors in the environment, for example parasitic and respiratory infections, which may result in a lower effect on growth of infected children, and dietary vitamin A intake, also with a negative effect on the relationship between vitamin A supplementation and growth [14, 15]. Such variations in study findings suggest the importance of environmental context and hence the need for context-specific studies on the association between vitamin A supplementation and child growth.

The positive association between receiving vitamin A supplements and stunting observed in this study indicates that over and above any interactions between vitamin A supplementation and other factors affecting child morbidity and mortality, there may still be a net beneficial effect of providing vitamin A supplementation. Continued government support of this important primary health intervention is essential, not only in addressing morbidity and mortality, but also in addressing malnutrition. This is particularly important with regards to stunting, given its short-term and long-term adverse effects, and which has persisted as a major public health concern in Kenya for many years [8, 25]. It is unfortunate though that the coverage of vitamin A supplementation for the targeted age group (6-59 months) is very low at 30%, with coverage being particularly low after the second year of life, and decreases with age [8]. The low coverage is despite the fact that vitamin A is readily available in MCH facilities, i.e. 94% of facilities offering vaccinations also have vitamin A [26].

In this study our main focus was on the association between receiving vitamin A supplement and stunting. However, we also established an even stronger negative relationship between receiving vitamin A supplement and underweight status. This relationship adds to the potential net benefit of vitamin A supplementation on growth among children in Kenya that should inform existing and future interventions on vitamin A supplementation. Additionally, we were able to establish other potential co-risk factors of undernutrition at the child, maternal and household levels. However, this was beyond the focus of this study, and these factors have been explained in other studies in Kenya [27, 28], and elsewhere [29-32].

Despite the importance of this study in determining the relationship between receiving vitamin A supplements and undernutrition, we acknowledge possible endogeneity of receiving the supplement in that it may be influenced by other explanatory variables in the model including socio-economic status and mother's education, hence potential simultaneity bias. More complex analytic models beyond the scope of this study may be worthwhile in further explorations of this relationship. Additionally we are not able to establish a causal relationship, given the cross-sectional nature of the data. What we do know from the data, however, is that vitamin A supplements were given prior to the date when the outcome variables for stunting, wasting and underweight status were recorded. Further longitudinal studies to determine causal relationship are recommended. The Kenya demographic and health survey did not obtain data for all vitamin A supplementation doses. We therefore could not establish the dose-response relationship.

In summary, this study has demonstrated that vitamin A supplementation may be beneficial to the growth of young children, potentially either through protective mechanisms or through reversal of malnutrition [16, 22]. This is an important finding that should guide policy and programs regarding vitamin A supplementation among children under age five through the primary health care system in Kenya and elsewhere in sub-Saharan Africa. However, further studies, as mentioned earlier are needed to better understand this relationship for more effective and targeted policies and programs.

POLICY IMPLICATIONS

The prevalence of stunting for children aged less than five years, particularly those aged two years in Kenya is worrying. The low coverage of vitamin A supplementation, only at 30% among children 6-59 months in the six months preceding the survey [8] is also of great concern, given that it is freely available for all children aged 6-59 months. The coverage of vitamin A supplementation among children aged three to five years is currently (since 2011) being maximized through provision at early child development (ECD) Centres. However, children aged two years are left out. This is because they usually have not joined the ECD Centres, and because they have generally completed the immunization schedule, they are hardly in contact with the primary health care facilities where they would be offered the supplements. There is need to find innovative and effective ways of reaching this group, and also those aged one year, who are also left out as most have also completed their immunization schedule by the age of one year. We recommend task sharing in vitamin A supplementation, allowing vitamin A supplementation to be given through the community strategy by community health workers who are in regular contact with children in the community.

ACKNOWLEDGEMENTS

This study was conducted through a DHS Further Analysis workshop organized and facilitated by ICF International and the National Council for Population and Development (NCPD), Kenya. We particularly acknowledge technical support from Sarah Staveteig and Sarah Bradley of ICF International. The initial manuscript was reviewed by Bryant Robey of ICF International and Geroge Kichamu of NCPD. We also acknowledge contribution of Margaret Kungu of NCPD in recoding of variables. Elizabeth Kimani-Murage is a Wellcome Trust Fellow.

CONFLICT OF INTEREST

To the best of our knowledge, there is no conflict of interest. Further, we would like to note that the views expressed by the authors do not necessarily reflect those of USAID.

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Women's Empowerment and Unmet Need for Family Planning in Kenya

Margaret Ndwiga

Peter Koome¹

Irene Muhunzu²

Corresponding Author: Margaret Ndwiga, Science Department, School of Science, Engineering, and Health, Daystar University, Nairobi, Kenya. Email: wawi_maggi@yahoo.com or wawira.maggi@gmail.com.

¹ Institute for Development Studies, University of Nairobi, Nairobi, Kenya. Email: mpkoome@yahoo.com.

² Family Health Options (FHOK), Nairobi, Kenya. Email: imuhunzu@fhok.org.

ABSTRACT

BACKGROUND

Unmet need for family planning in Kenya increased from 24 percent in 2003 to almost 26 percent in 2008. In Kenya high levels of unmet need are a consequence of diverse constraints imposed on women that inhibit their efforts to achieve their desired number of children and their ability to practice contraception. This paper examines the association between unmet need for family planning and women's empowerment in Kenya.

METHOD

The association was examined using bivariate and multivariate data analysis from the 2008-09 Kenya Demographic and Health Survey (KDHS). Analysis using the chi-square test was performed to check the significance of the association of unmet need with women's background characteristics and indicators of women's empowerment. Logistic regression analysis was used to predict the likelihood of women experiencing unmet need for family planning when exposed to different empowerment variables.

RESULTS

Women's employment and mode of payment emerged as a significant predictor of unmet need after controlling for the confounding effects of all the other variables, including age, education, type of residence, region of residence, and wealth. Women who worked in the year preceding the survey but were not paid had 37 percent lower odds for having unmet need compared with the reference group of women who did not work. Similarly, women who were paid in cash only as well as those who were paid in kind only or in cash and in kind had 28 percent and 55 percent lower odds of having unmet need respectively compared with those who did not work. Thus women's work status is a significant factor in explaining differences in unmet need.

CONCLUSION

Experience of spousal violence emerged as a significant predictor of unmet need for family planning after removing the husband/partner control variable from the model, implying that there could exist a relationship between husbands' controlling behaviour and women's experience of spousal violence, both factors considered in the literature as contributing to disempowerment of women.

The paper recommends the need to address factors influencing access to family planning services in order to reduce current levels of unmet need. At the programme level, the study also recommends formation and/or strengthening of programmes focusing on women's empowerment.

INTRODUCTION

BACKGROUND

When women have access to family planning, they are better able to prevent unintended pregnancies and unwanted births, achieve education and employment goals, increase family incomes, and contribute to development. A woman's decision to use or not to use family planning services, however, is ultimately a function of household dynamics, including familial relationships (which may determine whether women have control over their own lives or not), available resources, and household decision-making. Thus women's empowerment indicators, such as the number of decisions a woman makes individually or makes collectively with her spouse and the resources available for health care (through paid employment) indirectly affect use of family planning services and therefore also affect unmet need for family planning.

Women with unmet need are defined essentially as those who are fecund and sexually active but not using any method of contraception and who do not want to have any more children or who to delay their next birth for at least two years (United Nations, 2011). In Kenya, there has been a rise in the level of unmet need for family planning, from 24 percent in 2003 to almost 26 percent in 2008 (NACPD, 2010), suggesting that a growing percentage of married women are having more children than they would prefer. This study seeks to understand the nature and strength of the association between indicators of women's empowerment and unmet need for family planning among currently married women in Kenya, using data from the 2008-09 Kenya Demographic and Health Survey (KDHS).

CONCEPT AND DIMENSIONS OF WOMEN'S EMPOWERMENT

Women's empowerment is a multi-dimensional concept, whose definition encompasses women's expansion of opportunities to participate in all aspects of life, including (but not limited to) education, wage employment, decision-making, and access to information and services that could improve their lives (World Economic Forum, 2005). Greater participation not only helps improve women's individual lives but also contributes to socioeconomic development of their communities. From a programme perspective, it has been hypothesized that population and development programmes are more effective when they address educational opportunities, status, and empowerment of women (UNFPA, 2012). This is because in developing countries women bear most of the household responsibilities for meeting basic family needs, yet most do not have the resources, information, and individual freedom they need to fulfil this task, according to the Africa Volunteer Integration Network (AVIN, 2012).

Some proponents of women's empowerment identify several broad dimensions of empowerment: economic empowerment (sometimes referred to as a resource dimension), educational empowerment, political empowerment, social well-being or a sociocultural dimension, and interpersonal/familial dimension (World Economic Forum, 2005; Malhotra, 2003). Some of these dimensions, however, are not applicable at the household level and can only be analysed at community or higher levels, for example, the political dimension.

Kabeer (1999) considers empowerment to be about change: people acquire the ability to make strategic life choices in a situation where this ability was previously denied. It can therefore be argued that this change could occur in the various dimensions outlined above; that is, women could acquire access to or control of resources (economic empowerment), could be more involved in decision-making, either individually or collectively (socio-cultural/familial), and could achieve certain goals or outcomes that clearly indicate they are empowered. In terms of health outcomes, research findings have suggested that empowering women and increasing their ability to make decisions may influence uptake of reproductive health services (Hou and Ma, 2011). Such reproductive health services include family planning and maternal health care that ultimately influence the quality of family health for women and their families.

INDICATORS THAT MEASURE WOMEN'S EMPOWERMENT

In most studies relating to women's empowerment, the indicators used to measure empowerment reflect some or all the dimensions identified above, depending on the context and field of study. In health and demographic studies, the emphasis is mainly on indicators that have a bearing on women's health and demographic outcomes. Such outcomes include access to and use of facilities for reproductive health (including uptake of family planning), nutrition status, fertility, mortality, or overall population growth. Indicators relating to economic or resource dimensions of empowerment are also important because they affect the extent to which women can access and pay for health care information and services. Paid employment is therefore a strong indicator of women's economic empowerment.

Inter-familial and household relationships have been cited as possible sources of disempowerment for women, especially in patriarchal communities (Malhotra, 2003). Sometimes, access to resources does not automatically lead to control over use of the resources; the husband or other family members rather than the wife make crucial decisions on how resources are distributed within the household and also control the woman's freedom of movement outside the home (freedom of movement is considered a way of enhancing access to information and services). Indicators of women's empowerment in relation to this sociocultural/familial dimension are participation in decision-making (ability to make childbearing decisions and use contraception among other decisions), freedom from violence, and freedom of movement, among others (Al Riyami et al, 2004 and Malhotra, 2003).

It is worth noting that some of the variables such as women's education and employment that have been frequently used as proxies for women's empowerment only work through other proximate indicators. Education helps women access employment opportunities (Ashford and Noble, 1996) outside the home and indirectly access resources while creating opportunities for access to information and services for improving family health. Employment as an indicator of empowerment is important when one considers the mode of payment, whether for pay or not, on the assumption that working for pay increases access to resources.

LITERATURE REVIEW

According to UNFPA, an estimated 150 million women worldwide want to delay or avoid pregnancies but are not using family planning methods (UNFPA, 2009, cited in Ferdousi et al., 2010). In sub-Saharan Africa, nearly one married woman in every four has an unmet need for family planning (Maki, 2012). Studies have shown the extent of unmet need and attempted to explain the reasons why women who do not want to become pregnant right away nonetheless do not use contraception. Reasons for non-use vary from concerns about contraceptive methods themselves (side effects) and service delivery quality to socioeconomic and sociocultural factors. Casterline and Sinding (2000) contend that stakeholders concerned with family planning programmes need to understand the extent to which non-use is a result of reasons related to contraceptive methods themselves or to service delivery versus reasons related to sociocultural factors, such as husbands' opposition to contraception use.

There is considerable literature linking unmet need for family planning with women's socioeconomic characteristics such as age, education, type of residence (rural or urban), discussion of family planning with a health worker or husband, household wealth, and employment (Korra, 2002; Ojaka, 2008; Ndaruhuye et al., 2009; Hailmariam and Haddis, 2011). Few studies, however, have examined exclusively the effect of women's empowerment indicators on unmet need. Fewer studies have focused on sub-Saharan African countries, where gender-related social and cultural obstacles arising from predominantly patriarchal family systems prevent women from realising their desired fertility preferences. In most cases, men have greater decision-making power than women over childbearing preferences.

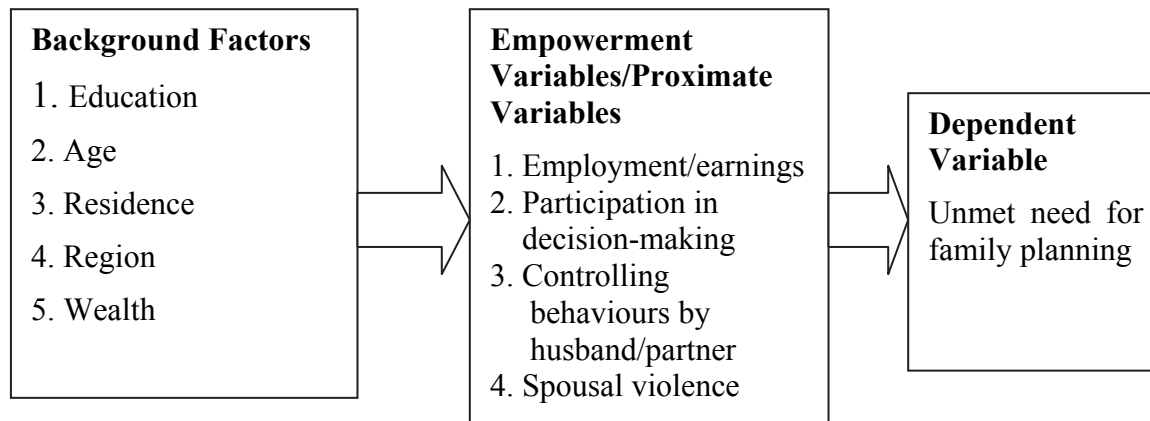
Women's active participation in domestic decision-making within the household, which reflects their power or autonomy within the household, may increase their chances of realising their childbearing preferences (Dharmalingam and Morgan, 1996, as cited in Woldemicael and Beaujot, 2011). Using evidence from the 1992 and 2002 Eritrea Demographic and Health Surveys, Woldemicael and Beaujot found that unmet need for family planning is associated with a woman's position within the household, as measured by her level of autonomy. Women with little autonomy were more likely to have higher levels of unmet need than women with more autonomy. Decision-making and freedom of movement were used to construct an indicator of autonomy.

There is a dearth of research on the association between women's empowerment and unmet need for family planning in the Kenyan context, where unmet need for family planning stands at 26 percent among currently married women (KNBS and ICF Macro, 2010). Investigating this linkage is aimed at informing policies and programmes geared towards increasing contraceptive use among Kenyan women, as Kenya gears up to reposition family planning to realise the goals of Vision 2030.

HYPOTHESIS AND CONCEPTUAL FRAMEWORK

The objective of the study is to examine the relationship between women's empowerment and unmet need for family planning in Kenya. The hypothesis is that women's empowerment is negatively associated with unmet need. The more empowered women are, the lesser is the likelihood of their having unmet need.

The study hypothesizes that women's empowerment, as measured by proxy variables such as employment and mode of pay, participation in decision-making, and controlling behaviours by husbands/partners, may have an effect on women's use of family planning and hence influence unmet need. In attempting to establish whether there exists a relationship between these variables and unmet need for family planning, the investigation takes into consideration the effect of background variables by controlling for women's education level, age, type of residence, region of residence, and wealth, as illustrated by the diagram below.



METHODS

DATA

The analysis is based on the 2008-09 Kenya Demographic and Health Survey (KDHS), a nationally representative survey carried out every five years and designed to provide data on population and health in Kenya. The 2008-09 KDHS was a follow-up of previous KDHS surveys conducted in 1989, 1993, 1998, and 2003. The research design of the survey is detailed in the KDHS final report (KNBS and ICF Macro, 2010). Data were collected from a sample of women of reproductive age (15-49) and a sample of men age 15-54 in a one-in-two sub-sample of surveyed households. For the purpose of this investigation, we limited the study population to married women age 15-49 who met our criterion for the analysis of unmet need. The criterion for inclusion was that the woman should be currently married or living together with her husband/partner.

CONCEPTUALISING UNMET NEED

The dependent variable of the study is unmet need for planning. This study employed the definition of unmet used in the KDHS, which includes pregnant women whose current pregnancy was mistimed or unwanted¹, as well as amenorrhoeic women whose last pregnancy was mistimed or unwanted. In this investigation, women considered infecund, for example those who did not have a birth in the last five years and were not using contraception, were not included, as recommended in the revised definition of unmet need (Bradley et al., 2012). Figure 1 illustrates the concept of unmet need applied in this study.

The sample further included only currently married women living together with husband/partner, and was weighted using the domestic violence variable. The number of women who met this criterion is 2617².

ANALYTIC TECHNIQUES

The analysis of the relationship between women's empowerment and unmet need for family planning was performed in SPSS. The first step of the analysis involved a description of the background characteristics of the respondents. Cross-tabulations with Pearson's chi-square test were performed to check the significance of the association of unmet need with background characteristics and women's empowerment indicators.

Further, logistic regression was used to predict the odds of women experiencing unmet need for family planning when exposed to different empowerment variables. This was necessitated by the binary nature of the dependent variable (unmet need). Logistic regression has the advantage of allowing for inclusion of statistical controls, which is not possible with cross-tabulations. Moreover, the odds ratios generated permit direct observation of the relative importance of each independent variable in predicting the likelihood of experiencing the event of interest compared with the reference category.

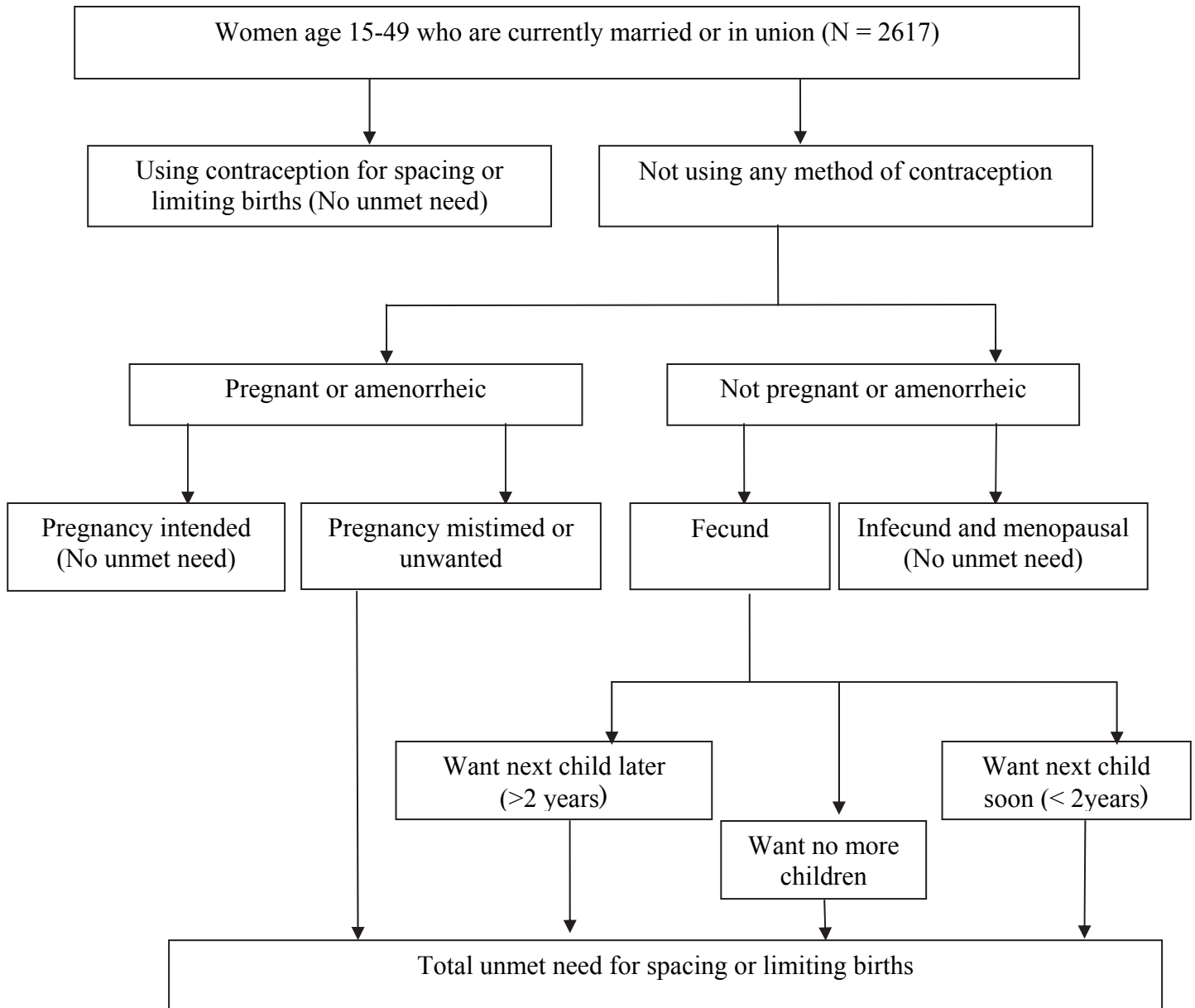
¹ Unmet need for spacing includes women who are fecund and not using family planning and who say they want to wait two or more years for their next birth, or who say they are unsure whether they want another child, or who want another child but are unsure when to have the child. In addition, unmet need for spacing includes pregnant women whose current pregnancy was mistimed, or whose last pregnancy was unwanted but who now say they want more children. Unmet need for spacing also includes amenorrhoeic women whose last birth was mistimed, or whose last birth was unwanted but who now say they want more children.

Unmet need for limiting includes women who are fecund and not using family planning and who say they do not want another child. In addition, unmet need for limiting includes pregnant women whose current pregnancy was unwanted but who now say they do not want more children or who are undecided whether they want another child. Unmet need for limiting also includes amenorrhoeic women whose last birth was unwanted but who now say they do not want more children or who are undecided whether they want another child (KNBS and ICF Macro 2010:97).

² Data are weighted by the weighting variable for domestic violence, which is D005.

Figure 1
Conceptualising unmet need

(Adopted from Bradley et al., 2011)



Women with unmet need were coded as 1, while those with no unmet need were coded as 0. Three multivariate logistic models were fitted. In the first model, all indicators of women's empowerment were included, while in the second model spousal violence was not included. The third model excluded the variable on controlling behaviours by husband/partner. This was to ascertain whether there is a possible linkage between husbands/partner's controlling behaviours and spousal violence. For each of the empowerment variables, the first category was set as a reference category. An odds ratio greater than 1 meant that the likelihood of a woman experiencing unmet need is higher compared with the reference category and *vice versa*. In all

these models, background characteristics are age, education, region, type of place of residence, and economic status as measured by wealth quintile.

PROXIMATE/PREDICTOR VARIABLES

In the 2008-2009 KDHS, one woman in each sampled household was asked a series of questions relating to some of the dimensions of women's empowerment. The independent variables of this study were derived from responses to some of these questions. Specifically, four indicators of women's empowerment were selected: employment and mode of payment; women's participation in household decision-making; husband's or partner's controlling behaviours, and experience of spousal violence. Recoding was done for some variables of interest to come up with various categories of the empowerment indicators as described below.

1. **Employment and mode of payment.** Women who work for pay are likely to be more empowered compared with those who work and are not paid or those who do not work. Employment and mode of payment categorized women into those who were not paid at all, those who were paid in cash only, those who were paid in cash and in kind, and those who did not work in the 12 months preceding the survey.

2. **Number of decisions a woman can make in the household.** The greater the number of decisions a woman makes concerning health care and household expenditures, the more empowered she is likely to be. Women's participation in household decision-making was captured by five questions,³ which were combined and categorized thus: 0-2 decisions, 3-4 decisions, and all the five decisions.

3. **Number of husband/partner control behaviours.** The degree of marital control exercised by husbands over their wives' movement and association outside the home is a measure of women's autonomy or lack of it at the household level. Restrictions on movement and communication could imply that a woman has little power over her own decisions or other decisions made in the household. The five husbands' or partners' controlling behaviours⁴ were grouped into one composite variable with the following categories: no controlling behaviours; one or two controlling behaviours; and three or more controlling behaviours.

4. **Experience of spousal violence.** Freedom from gender-based violence is here considered to be a sign of empowerment that could also imply absence of control by husband/spouse. Although spousal violence can take many different forms, this study focused primarily on physical⁵, emotional, and sexual violence, as captured in the KDHS. A composite

³ Decisions on respondent's health care; making large household purchases; making household purchases for daily needs; visits to family or relatives; and food to be cooked each day.

⁴ The behaviours are: Husband jealous if talking with other men; husband accuses her of unfaithfulness; husband does not permit her to meet her girl friends; husband tries to limit her contact with family; husband insists on knowing where she is; husband doesn't trust her with money.

⁵ Both mild and severe forms were combined first before the variable was used to compute "physical violence."

variable was then constructed to categorise women into those who experienced spousal violence and those who did not.

BACKGROUND/CONTROL VARIABLES

The study controlled for possible confounding effects of selected background characteristics: age, education, region, type of place of residence, and wealth index (a proxy measure of access to resources and information). According to previous studies, these variables are known to influence access and use of family planning (Ojaka, 2008).

RESULTS

BACKGROUND CHARACTERISTICS OF RESPONDENTS

Table 1 shows that currently married women age 25-29 account for the largest percentage of the sample (23 percent), followed by currently married women age 30-34 (20 percent). Three-quarters of the women sampled were living in rural areas, and about two-thirds had attained a primary education. 27 percent of the women in the sample were from the Rift Valley region, while North Eastern region accounted for less than 1 percent.

Table 1: Percent distribution of currently married women age 15-49 by background characteristics

Background characteristic	Percent	Number =2617 (Weighted)
Age		
15-19	3.2	83
20-24	18.5	484
25-29	22.8	597
30-34	20.3	531
35-39	14.9	391
40-44	11.7	306
45-49	8.6	224
Education		
No education	6.6	173
Primary	61.7	1614
Secondary	25.4	666
Higher	6.3	164
Region		
Nairobi	7.4	192
Central	12.9	338
Coast	7.2	189
Eastern	17.9	467
Nyanza	16.4	428
Rift Valley	26.9	703
Western	10.7	280
North Eastern	0.7	19
Type of place of residence		
Urban	23.6	617
Rural	76.4	1999
Wealth index		
Poorest	14.7	384
Poorer	19.1	501
Middle	19.9	520
Richer	21.2	554
Richest	25.1	657

Source: Authors computation from 2008-2009 KDHS data.

WOMEN'S BACKGROUND CHARACTERISTICS AND UNMET NEED

Table 2 shows that women's age, education, place of residence, region of residence, and wealth status are significantly associated with unmet need for family planning. Women under age 30 had higher proportions with unmet need than older women. Unmet need was higher among women with no education compared with those with primary, secondary, or higher education. The difference between women with unmet need in the group with no education compared with those with primary education is almost 20 percentage points. The p value of 0.001 across all the background variables indicates a statistically significant association between the five variables (age, education, type of residence, region of residence, and wealth) and unmet need, at over a 99 percent confidence level (that is, the association between background variables and unmet need is not due to chance).

Table 2: Percent distribution of currently married women age 15-49 with an unmet need for family planning, according to background characteristics (with Chi-square to test association)

Background characteristics	Percent with unmet need	Number	P values for respective variables
Age			
15-19	55.9	83	p<0.001
20-24	49.3	484	
25-29	37.4	597	
30-34	29.9	531	
35-39	32.2	391	
40-44	29.9	306	
45-49	32.5	224	
Education			
No education	61.0	173	p<0.001
Primary	41.4	1,614	
Secondary	24.7	666	
Higher	11.4	164	
Region			
Nairobi	23.2	192	p<0.001
Central	17.4	338	
Coast	40.6	189	
Eastern	32.5	467	
Nyanza	48.0	428	
Rift Valley	44.3	703	
Western	33.1	280	
North Eastern	83.4	19	
Type of place of residence			
Urban	28.3	617	p<0.001
Rural	39.2	1,999	
Wealth index			
Poorest	62.9	384	
Poorer	46.0	501	
Middle	31.0	520	
Richer	27.6	554	
Richest	26.1	657	

Source: Authors' computations of 2008-2009 KDHS data.

Women living in rural areas had higher levels of unmet need than women living in urban areas. Women living in the richest households had the lowest percentage with unmet need. Indeed, the poorest quintile had more than twice the percentage of women with unmet need compared with the richest quintile. With the exception of women in North Eastern region, which had an unusually high percentage of women with unmet need for family planning (83 percent),

women in Nyanza (48 percent), Rift Valley (44 percent), and Coast (41 percent) regions had much higher levels of unmet need compared with women in Central (17 percent) and Nairobi (23 percent) regions.

WOMEN'S EMPOWERMENT AND UNMET NEED

Table 3 shows the percent distribution of currently married women with unmet need for family planning by selected indicators of women's empowerment. The percentage with unmet need was highest among women who did not work in the 12 months preceding the survey (46 percent) and lowest among those who worked and received payment in kind only or both cash and in kind (29 percent). Among women who worked but did not receive payment, unmet need was 39 percent.

Table 3: Percent distribution of currently married women age 15-49 with an unmet need for family planning, by women empowerment indicators (with Chi-square to test association)

Empowerment characteristic	Percent with unmet need	Number (weighted)	P values for respective variables
Employment and mode of payment for work¹			
Not paid	39.6	473	p<0.001
Cash only	30.1	1,098	
In kind only or cash and in kind	29.4	250	
Did not work last year	46.0	792	
Decisions a woman can make in the household²			
0-2 decisions	47.2	378	p<0.001
3-4 decisions	39.0	866	
All 5 decisions	32.2	1,370	
Number of husband/partner control behaviours			
None	35.8	975	p<0.05
1 or 2 behaviours	34.1	1,024	
3+ behaviours	42.1	618	
Experience of spousal violence			
No spousal violence	33.8	1,461	p<0.001
Spousal violence	40.2	1,156	

¹ Number excludes three missing cases.

² Number excludes two missing cases.

The results also showed an inverse relationship between unmet need and the number of decisions a woman participated in within her household. The higher the number of decisions, the lower the unmet need. Among women who participated in decisions on all five household issues examined, 32 percent had an unmet need compared with 47 percent among women who made decisions on one or two household issues, or not at all. Women whose husbands tried to control their actions in three or more ways had higher unmet need (42 percent) than those whose husbands had no controlling behaviours (36 percent). Overall, there was a statistically significant association between the empowerment indicators and unmet need for family planning. Association of unmet need with employment, decision-making, and experience of spousal

violence was at $p < 0.001$, and association of unmet need with husbands'/partners' control was at $p < 0.05$.

Multivariate Analysis

Two multivariate regression models were fitted to test the direction and strength of association between the different measures of women's empowerment and unmet need for family planning.

Table 4 presents results of the regression analysis showing the association between empowerment indicators and unmet need, controlling for the selected background factors (age, education, type of place of residence, region, and wealth status).

Although unmet need was associated with factors such as age, education, rural-urban residence, region of residence, and wealth status (the background variables in this study), women's empowerment was a critical intervening factor. The three models focused on the proxy measures of women's empowerment, the explanatory variables of this study, while controlling for the background characteristics. The first of the three models included all of the four variables (employment and mode of payment; number of controlling behaviours by husband or partner; number of decisions a woman participates in making by herself or with a husband or partner; and experience of spousal violence). Since the husbands' or partners' controlling behaviours may be correlated with spousal violence, the second model excluded spousal violence, while the third model excluded husband controlling behaviours.

When all indicators of women's empowerment were included in the model, the only variable that displayed a statistically significant association after controlling for background characteristics was employment and mode of payment. Compared with women who did not work in the year preceding the survey, those who worked but were not paid had a 37 percent lower odds of having unmet need for family planning, and the difference was statistically significant at the 99 percent confidence level. Women who were paid in kind only or in cash and in kind had a 55 percent lower odds of having unmet need compared with those who did not work, with the difference being statistically significant at the 99 percent confidence level. This percentage was much higher than the comparison with women who worked and were paid cash only (with 28 percent lower odds). All other women's empowerment variables were not significantly associated with unmet need in this model, which had all the predictors.

It is worth emphasizing that, while the association between employment and unmet need remains significant in all the three models, exclusion of spousal violence marginally changes the odds for unmet need among women who worked without pay compared with those who did not work (from 37 percent to 36 percent lower odds of having unmet need). In contrast, after exclusion of husband's/partner's controlling behaviour from the model, the odds for unmet need among these women was 38 percent lower compared with women who did not work in the year preceding the survey.

Table 4. Odds ratios from logistic regression showing the association between women's empowerment and unmet need for family planning among currently married women age 15-49 (N=2617 Weighted)

Background characteristic	Model 1: all variables included				Model 2: spousal violence not included				Model 3: husband/partner control not included			
	Odds ratios	P Values	95.0 percent C.I. for EXP(B)		Odds ratios	P Values	95.0 percent C.I. for EXP(B)		Odds ratios	P values	95.0 percent C.I. for EXP(B)	
Mode of payment for employment												
(Did not work last year)	1											
Not paid	0.627	0.001	0.478	0.823	0.643	0.001	0.491	0.843	0.618	0.001	0.471	0.810
Cash only	0.718	0.003	0.579	0.892	0.738	0.005	0.596	0.914	0.714	0.002	0.575	0.886
In kind only or cash and in kind	0.447	0.000	0.318	0.626	0.467	0.000	0.334	0.653	0.453	0.000	0.324	0.635
Husband control behaviours												
(No control)	1											
One or two control behaviours	0.874	0.201	0.712	1.074	0.907	0.342	0.741	1.11				
Three or more control behaviours	1.104	0.427	0.865	1.408	1.19	0.138	0.945	1.498	Not included in this model			
No. of decisions a woman participates in												
(0-2 decisions)	1											
3-4 decisions	1.050	0.721	0.802	1.375	1.049	0.729	0.801	1.373	1.034	0.809	0.790	1.352
All the 5 decisions	0.927	0.569	0.713	1.204	0.917	0.519	0.706	1.192	0.920	0.528	0.709	1.193
Experience of spousal violence												
(No spousal violence)	1.000											
Spousal violence	1.203	0.060	0.993	1.459	Not included in this model				1.226	0.028	1.022	1.471

Note: Reference categories are in parentheses. Control variables were age, education, region of residence, type of place of residence, and wealth index.

Removing husband's/partner's controlling behaviour from the model also makes spousal violence a significant predictor of unmet need, implying some collinearity between women's experience of spousal violence and a husbands' controlling behaviour. When the husband/partner control variable was excluded from the model, women who experienced spousal violence had 23 percent higher odds for unmet need compared with women who did not report experiencing any form of spousal violence. These results were statistically significant at $p < 0.05$.

DISCUSSION

The study was guided by the postulate that women's empowerment is an important factor not only in knowledge and attitudes towards family planning but also, importantly, in influencing decisions to use family planning methods. Therefore, women's empowerment is negatively associated with unmet need.

Results from the analysis of the association between background characteristics and unmet need (Table 2) reveals a strong and highly significant association ($p < 0.001$) between unmet need for family planning and woman's age, education, place of residence, region, and wealth status. Younger women have higher rates of unmet need than older women. Unmet need appears to decline with increased education and wealth status. Women living in urban areas have lower levels of unmet need than rural women. Women who are more educated and women who are wealthier can afford to buy contraceptives and are more likely to reside in urban areas, where contraceptives are more accessible than in rural areas. They are also more informed about available family planning methods and are more likely to prefer small families than their less educated and less well-to-do counterparts. These results confirm findings from other countries on the association of such background characteristics as women's age, education levels, type of residence, and wealth with unmet need (Korra, 2002; Ndaruhuye et al., 2009; Hailmaria and Haddis, 2011).

By region of the country, women in North Eastern, Nyanza, Rift Valley, and Coast have higher levels of unmet need for family planning compared with women in Central and Nairobi. The results are consistent with previous findings in Kenya by Ojaka (2008). A high level of unmet need in these regions is also consistent with the fact that the same regions also have lower contraceptive prevalence and consequently higher fertility rates compared with Central and Nairobi (KNBS and ICF Macro, 2010).

Analysis of the association between unmet need for family planning and selected women's empowerment variables yields similar results (Table 3) and conforms to the expectation that women who are more empowered have lower levels of unmet need. Women who worked in the 12 months preceding the survey have lower levels of unmet need than those who did not work. Women who received cash or in-kind payment have lower levels of unmet need than women who worked but received no pay. Currently married women whose husbands try to control their actions have higher unmet need than those whose husbands are not controlling. Women who participate in decision-making on more household issues have lower unmet need than those who make fewer decisions. This finding confirms the results of a study in Eritrea that women's decision-making (as one of the determinants of women's autonomy) influences unmet need (Woldemicael and Beaujot, 2011).

Multivariate analysis of the association between unmet need for family planning and women's empowerment indicators, while controlling for selected background factors, showed that lack of employment is a significant predictor of unmet need. Women who worked in the year preceding the survey have significantly lower odds for having unmet need for family

planning compared with women who did not work, even when the work was not for pay. Compared with those who did not work, women who worked and were paid in cash or both in cash and in kind had a greater likelihood of not having unmet need – the odds of having unmet need were 55 percent lower. This result confirms our hypothesised association between women’s employment and unmet need.

After removing controlling behaviour by husbands/partners from the model, women’s experience of spousal violence emerged as a significant predictor of unmet need for family planning. This finding not only confirms our hypothesised link between spousal violence and unmet need but also indicates a possible relationship between husbands’ controlling behaviours and women’s experience of spousal violence.

According to theories of women’s empowerment and evidence from some studies, equity in household decision-making is associated with positive outcomes in various spheres, including health (Hou and Ma, 2011, Desai and Johnson, 2005). Our analysis, however, did not find any statistically significant associations between the number of household decisions a woman makes and unmet need for family planning.

CONCLUSION

From the preceding discussion, women’s background characteristics—age, educational level, region, type of place of residence, and wealth index—are all (as expected) significantly associated with unmet need for family planning. While indicators of women’s empowerment are also significantly associated with unmet need, only a woman’s lack of employment appears as a significant predictor of unmet need after controlling for the confounding effects of all other variables.

Spousal violence also emerges as a predictor of unmet need but is interlinked with husband/partner controlling behaviour. It is therefore important that national programmes aimed at reducing unmet need for family planning address the economic dimension of women’s empowerment as well as familial interrelationships aimed at improving spousal relations.

Policy-makers need to emphasize building partnerships among sectors focusing on expanding employment opportunities for women. This emphasis goes hand in hand with programmes aimed at reducing gender disparities in educational attainment, so as to increase chances for women in paid employment. Therefore, any anticipated reduction in unmet need for family planning needs to factor in women’s access to resources through employment, and also the need for programmes to improve spousal communication. Improvement in spousal communication will not only enhance collective decision-making among couples in relation to family health and family planning but will also help to reduce incidence of spousal violence, which in this study has been significantly associated with higher levels of unmet need. Of pivotal importance is the need for innovative strategies for men’s involvement in family health, including family planning.

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Lack of an Association between Gender-based Violence and HIV Infection among Married Women in Kenya: Evidence from a Population-based Survey

Amin Hassan
Elizabeth Buluku¹
Francis Kundu²

Corresponding Author: Amin S. Hassan, KEMRI/Wellcome Trust Research Programme, P.O. Box 230 – 80108, Kilifi, Kenya. Email: ahassan@kemri-wellcome.org; Telephone: +254 41 7522535; +254 41 75222063.

¹ Department of Epidemiology and Nutrition, Moi University, Eldoret, Kenya.

² National Council for Population and Development, Nairobi, Kenya.

ABSTRACT

BACKGROUND

The increase in the prevalence of gender-based violence (GBV) and its co-occurrence with HIV infection has been widely reported. Studies have shown contradictory evidence on the association between GBV and HIV infection however. Little data exists on the association between GBV and HIV infection in Kenya. This study uses data from the 2008-09 Kenya Demographic and Health Survey (KDHS), a nationally representative population-based survey, to describe the association between GBV and HIV infection in Kenya.

METHODS

Analysis was limited to data on married women interviewed in households that were eligible for HIV testing. Women not captured in the KDHS domestic violence module and women who refused HIV testing were excluded from the analysis. HIV test results were the main outcome variable, while GBV was considered the primary exposure variable. In this study, GBV is defined as physical, sexual, or emotional violence perpetrated against women by their partners. Other risk factors included women's age, level of education, occupation, contraceptive use, wealth index, type of marriage (monogamous or polygynous), place of residence (rural or urban), and spousal alcohol consumption. Logistic regression was used to describe the independent association between GBV and HIV infection.

RESULTS

Of the 1,789 women who met the eligibility criteria, 44 percent had ever experienced any form of GBV, while 7 percent tested HIV-positive. The prevalence of HIV infection was generally higher among married women who had experienced any form of GBV compared with women who had not experienced any form of GBV. However, in the multivariable analysis, there was poor evidence of an association between any form of GBV and HIV infection (Adjusted Odd Ratios [95 percent CI], p-value; 1.3 [0.7–2.6], p=0.372). Poor evidence of an association was also found between emotional, sexual, and physical violence and HIV infection.

CONCLUSION

The lack of an association between GBV and HIV infection among married women in Kenya suggests that these two public health concerns may be addressed independently at the policy level.

INTRODUCTION

Around the globe, an estimated 34 million people were living with HIV at the end of 2010. The sub-Saharan Africa region is the most heavily affected by the pandemic, with an estimated 22.4 million people living with AIDS—around two-thirds of the total (UNAIDS, 2010). In Kenya, 6.3 percent of adults age 15-49 are infected with HIV, with a prevalence of 8 percent among women and 4.3 percent among men (KNBS and ICF Macro, 2010).

The majority of people worldwide who live with HIV are women. Some studies have suggested that one of the main risk factors for HIV infection in women is gender-based violence (GBV) (Coker et al., 2000; Jewkes et al., 2010; Karamagi et al., 2006). The co-occurrence of HIV infection and GBV has emerged as a significant public health problem in the past decade, with an increase in the prevalence of GBV widely reported in both the developed and developing countries⁶ (Heise, 1993; Pitpitan, 2012). In Kenya, population-based data from the nationally representative 2008-09 Demographic and Health Survey (DHS) show that 47 percent of married women in the domestic violence (domestic violence) module experienced some kind of violence from their spouses/partners (KNBS and ICF Macro, 2010).

Factors reported to increase the risk for GBV among women include low socioeconomic status, multiple sexual partners, polygynous relationships, alcohol abuse, cohabitation, young age, attitudes supportive of wife beating, growing up with domestic violence, history of contraceptive use (including condoms), and sexually transmitted infections by the woman (Abramsky et al., 2011; Garcia-Moreno et al., 2005). Cross-sectional data suggest that women with a secondary or higher education, women with high socioeconomic status, and women in formal marriages have less risk of experiencing GBV (Abramsky et al., 2011; Abuya et al., 2012)⁸.

Some cross-sectional studies from Africa have suggested that women who have experienced GBV are more likely to be HIV-infected (Karamagi, 2006; Pitpitan, 2012; El-Bassel et al., 2007; Fonck et al., 2005; Maman et al., 2002; Straten et al., 1998). In addition, a cohort study of young women in South Africa has shown that relationship inequality and GBV increase the risk of incident HIV infection (Jewkes et al., 2010), while a study from India also reported a positive association between GBV and HIV infection (Silverman et al., 2008). In contrast, a study using DHS data from 10 low-to-middle-income countries has shown that GBV is not associated with HIV infection (Harling, Msisha, and Subramanian, 2010). Study design and methodological differences have limited the extent to which comparisons can be made among the few available studies.

In recent years there has been increasing interest in the relationship between GBV and HIV infection. It has been suggested that GBV may be associated with HIV infection via several mechanisms, including direct effects through violent intercourse and indirect effects through inability to negotiate for safer-sex practices. Over the years Kenya has witnessed an increasing concern about the levels of both GBV and HIV. This concern culminated with the inclusion of GBV and HIV modules in the 2003 KDHS, with the aim of estimating the magnitude of these

two problems in the country. The 2008-09 KDHS was the second effort to estimate the prevalence of these two indicators in Kenya.

Because there is little data on the association between GBV and HIV infection in Kenya, this study seeks to describe the association between GBV and HIV infection among married women of reproductive age in Kenya. Specifically, the study aims to describe the association of individual components of the experience of GBV (physical, emotional, and sexual violence) on HIV infection.

METHODS

STUDY DESIGN

This study uses data from the 2008–09 Kenya Demographic and Health Survey (KDHS) (KNBS and ICF Macro, 2010). The KDHS is a cross-sectional survey designed to collect demographic and health data that are nationally and regionally representative. The DHS used a two-step multi-stage sampling design. Stratification was done from regions within provinces to obtain the primary sampling units (clusters). Households within clusters were then identified and allocated to interviewers for data collection. From the sampled households, women age 15–49 and men age 15–54 were identified for individual interviews. Although all women age 15-49 were interviewed, the Man’s Questionnaire was only administered to those living in every second household identified. In addition, a module on domestic violence was administered to one woman per household. HIV testing was done for consenting participants from all households selected for the Man’s Questionnaire.

Dried blood spots (DBS) were collected from all eligible participants for HIV testing based on the DHS anonymous linked protocol. HIV serostatus was determined centrally using enzymelinked immunosorbent assay (ELISA) test kits. Discrepant samples were tested for HIV-DNA using polymerase chain reaction (PCR).

For purposes of this study, the analysis was limited to data collected from women interviewed within households that were eligible for HIV testing. We selected women who were either formally married or living together as married with their partners. Women refusing consent for an HIV test and women not captured by the domestic violence module were excluded from the analysis.

Outcome variable

HIV test results were considered the main outcome variable for this study. The test results were captured as a binary outcome (0 and 1 denoting HIV-negative and HIV-positive status, respectively) in a separate dataset. Indeterminate HIV test results were dropped from the dataset. Data from the Woman’s Questionnaire were merged and linked with the HIV test results data using the unique participants’ identifiers.

Exposure variables

Gender-based violence (GBV) was the primary exposure variable. The study defined GBV as physical, sexual, or emotional violence perpetrated against the respondents by their husbands. Physical violence consisted of being pushed or shaken, slapped, arm twisted, punched, kicked, dragged, choked, burnt, or attacked with a weapon. Sexual violence comprised either being forced to have sexual intercourse or to perform any sexual acts against one's will. The study considered participants to have been emotionally violated if their husbands ever humiliated them in front of others, threatened to harm them, or insulted them. Any woman who had ever experienced any form of physical, sexual, or emotional violence from her current husband was considered to have experienced GBV.

A review of the literature suggests that age, level of education, occupation, contraceptive use, wealth index, type of marriage (monogamous or polygynous), place of residence (rural or urban), and spousal alcohol consumption are risk factors independently associated with GBV and HIV infection among women. These variables were hence considered *a-priori* confounders on the association of GBV with HIV infection. Age was stratified into three categories (15–24, 25–34, and 35–49). Education was categorized into four groups (no formal education, primary, secondary, and higher). Occupation was classified as not working, working at home, and working away from home. Current use of contraception was categorized as not using any method, using a barrier method (condoms), and using a nonbarrier method. Wealth was stratified into terciles (poor, middle, and rich), using the DHS wealth index factor score as captured in the household dataset (Rutstein and Johnson, 2004). Partner/spouse alcohol consumption (consumed any; no and yes) and polygyny (monogamous and polygynous relationships) were binary variables.

DATA ANALYSIS

All analysis was carried out using Stata statistical software (Stata Intercooled version 11, StataCorp, College Station, Texas, USA). The survey prefix was used to set the dataset for analysis while accounting for the complex survey design. For this, clusters were used as the primary sampling units, while residences (rural/urban) within provinces were defined as the strata. Weighting was applied in the analysis using the HIV test results weights to ensure true representativeness of the test result. Statistical Package for Social Scientists (SPSS version 18) software was used to check some of the results generated using Stata.

A basic description of the study population was done. Means and 95 percent confidence intervals (CI) were presented for continuous variables. Cross-tabulation was done for the different elements of GBV with all the other categorical exposure variables. Weighted frequencies, percentages, and row totals for individual categories within the exposure variables were presented. System missing data were also presented.

The overall prevalence of HIV infection was determined as a percentage of the number of participants with HIV-positive test results divided by the total number of women included in the study population. Sub-population prevalences of HIV infection were also determined for the

different forms of GBV and the other exposure variables. Univariate logistic regression was used to describe the crude effect of the different forms of GBV and the other exposure variables on HIV infection. Crude odds ratios (CORs), 95 percent CI, and Wald p-values were presented.

To control for potential confounding effects of the other exposure variables on the association of the different forms of GBV with HIV infection, multivariate logistic regression was done. Independent regression models were built to describe the net effect of physical, sexual, emotional, and any form of GBV on HIV infection. Adjusted odds ratios (AORs), 95 percent CI, and Wald p-values were presented.

ETHICAL CONSIDERATIONS

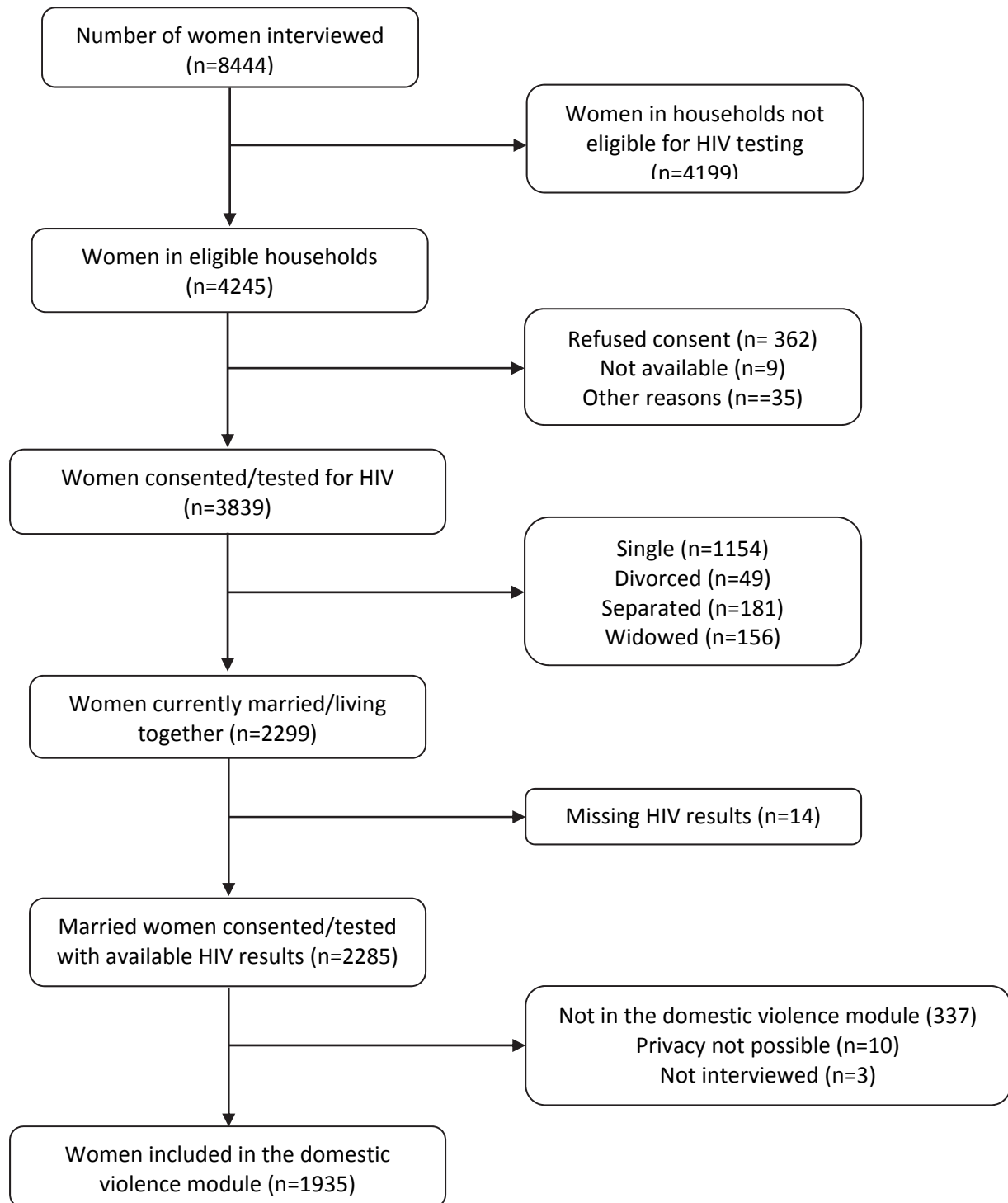
The protocol for blood specimen collection and analysis for the 2008-09 KDHS was reviewed and approved by the Scientific and Ethical Review Committee of the Kenya Medical Research Institute (KEMRI). Informed consent was obtained from eligible respondents for the domestic violence module and for participants who were requested to provide blood samples for HIV testing. Questions on domestic violence were only asked when respondents' privacy was ensured. Any information that could potentially identify participants was either destroyed, or (in the case of geo-coordinates) slightly displaced. Participants interested in finding out their HIV status were referred to the nearest Voluntary Counseling and Testing Centre.

RESULTS

Overall, 8,444 women were interviewed in the 2008-09 KDHS. Of these, 1,935 (23 percent) were married/living together with a partner in households eligible for HIV testing and included in the domestic violence module. After weighting, the number of eligible participants included in the study population comprised 1,789 women.

Of the 1,789 women who were tested for HIV (with definitive results) and sampled for the domestic violence module, 792 (44.3 percent) had ever experienced any form of GBV. Of the three different elements of GBV, physical violence was the most prevalent (n=792 [33.6 percent]), followed by emotional violence (n=508 [28.4 percent]) and sexual violence (n=247 [13.8 percent]).

Figure 1:
Flow diagram showing the criteria used to obtain the unit of analysis
from the available Kenya Demographic Health Survey (KDHS 2008-09) data



At the time of the survey, the mean age of the study participants was 31.0 years (95 percent CI, 30.4 – 31.5). The majority of the eligible participants were working at home (n=636 [35.7 percent]), were in the rich tercile (n=717 [40.1 percent]), and were from the Rift Valley province (n=478 [26.7 percent]). More than half had attained at least a primary education (n=1053 [58.9 percent]), were not using any contraceptive method (n=969 [54.1 percent]), were residing in rural areas (1369 [76.0 percent]), had partners who did not consume alcohol (1165 [65.2 percent]), and were in monogamous relationships (n=1559 [65.2 percent]).

Table 1: Percent distribution of different types of gender-based violence (GBV) by other background characteristics amongst married women in Kenya, KDHS 2008-09 (Weighted N=1789)

Background Characteristics	Emotional (n=508)	Sexual (n=247)	Physical (n=601)	Any form (n=792)	Total number (n=1789)
Age					
15–24	99 [22.9]	54 [12.5]	135 [31.2]	185 [40.6]	433
25–34	239 [29.7]	116 [14.4]	277 [34.5]	384 [45.3]	804
35–49	170 [30.9]	77 [14.1]	189 [34.3]	269 [46.4]	552
Education					
No education	65 [30.7]	32 [15.6]	85 [41.2]	102 [49.5]	207
Primary education	358 [32.1]	161 [15.3]	393 [37.4]	514 [48.9]	1,053
Secondary education	97 [22.0]	49 [11.6]	102 [24.3]	141 [33.5]	420
Higher education	19 [16.5]	5 [4.9]	21 [19.1]	36 [32.6]	110
Occupation*					
Not working	145 [23.4]	67 [10.8]	192 [30.9]	243 [39.1]	622
Working at home	207 [32.6]	85 [13.3]	233 [36.6]	316 [49.6]	636
Working away	155 [29.5]	95 [18.2]	176 [33.6]	233 [44.6]	526
Family planning					
No method	286 [29.6]	139 [14.4]	346 [35.8]	455 [47.1]	969
Non-barrier methods	216 [27.4]	103 [13.1]	250 [31.7]	326 [41.4]	788
Barrier methods (condoms)	6 [16.6]	5 [15.2]	5 [15.6]	11 [32.2]	33
Wealth Index					
Poor	174 [31.9]	91 [16.7]	215 [39.3]	271 [49.7]	546
Middle	151 [28.6]	69 [13.1]	193 [36.6]	239 [43.7]	526
Rich	183 [25.5]	87 [12.2]	193 [27.1]	291 [40.8]	717
Residence					
Urban	109 [25.3]	49 [11.4]	114 [26.4]	169 [39.2]	430
Rural	399 [29.3]	198 [14.6]	487 [35.9]	623 [45.9]	1,360
Partner/Spouse alcohol consumption*					
No	281 [24.1]	125 [10.7]	345 [29.6]	460 [39.5]	1,165
Yes	226 [36.3]	122 [19.7]	256 [41.1]	331 [53.2]	622
Polygyny*					
Monogamous relationships	424 [27.2]	196 [12.6]	482 [31.0]	649 [41.7]	1,559
Polygynous relationships	75 [36.2]	47 [22.7]	108 [51.9]	127 [60.9]	209
Province					
Nairobi	20 [15.1]	8 [6.1]	27 [20.0]	34 [25.8]	133
Central	44 [22.5]	19 [9.7]	48 [24.1]	67 [33.9]	197
Coast	53 [36.1]	23 [15.4]	33 [22.7]	68 [46.2]	147
Eastern	87 [28.4]	36 [11.8]	84 [27.7]	129 [42.3]	305
Nyanza	116 [38.7]	72 [24.3]	152 [51.1]	180 [60.4]	300
Rift Valley	117 [24.5]	51 [10.8]	147 [30.8]	187 [39.1]	477
Western	61 [34.7]	36 [20.5]	92 [52.9]	108 [61.7]	175
North Eastern	10 [508]	1 [2.4]	18 [32.5]	20 [36.1]	54

Note: Missing data: sexual violence (n=3 [0.2 percent]), physical violence (n=3 [0.2 percent]), any violence (n=2 [0.1 percent]), occupation (n=2 [0.1 percent]), alcohol consumption (n=3 [0.2 percent]) and polygyny (n=23 [1.2 percent]).

Among eligible participants, 124 women tested HIV-positive, with an overall HIV prevalence of 6.9 percent (95 percent CI, 5.4 – 8.5). In the univariate logistic regression, there was poor evidence of an association between any form of violence and HIV infection. Women who had ever experienced any form of GBV had a 60 percent higher odds of having HIV infection compared with those who had not experienced GBV (COR [95 percent CI], p-value; 1.6 [1.0 – 2.7], p=0.065). While there was poor evidence to suggest an association of sexual violence (p=0.067) or of emotional violence (p=0.442) on HIV infection, the data suggest strong evidence of an association between physical violence and HIV infection. Women who had ever experienced physical violence had two-fold higher odds of having HIV infection compared with those who had not experienced physical violence (COR [95 percent CI], p-value; 2.0 [1.2 – 3.3], p=0.005).

Contraceptive use and polygyny were also strongly associated with HIV infection. Women using non-barrier contraceptive methods had half the odds (p=0.006), while those using barrier methods (condoms) had three-fold higher odds (p=0.072) of having HIV infection, compared with women who were not using any contraceptive method. Women in polygynous relationships had three-fold higher odds of having HIV infection compared with women in monogamous relationships.

Table 2: Univariable analysis describing associations of the different types of gender-based violence and other risk factors on HIV infection amongst married women consenting to test for HIV in Kenya (KDHS 2008-09), (Weighted N=1789)

Background Characteristics	Number of women	Frequency of HIV [percent]	Crude OR [95 percent C.I]	P-value
Gender-based violence				
Emotional violence				
No	1,282	84 [6.6]	Reference	
Yes	508	40 [7.8]	1.2 [0.8 – 1.9]	0.442
Sexual violence				
No	1,539	100 [6.5]	Reference	
Yes	247	24 [9.8]	1.6 [1.0 – 2.5]	0.067
Physical violence				
No	1,186	63 [5.3]	Reference	
Yes	601	61 [10.2]	2.0 [1.2 – 3.3]	0.005
Any violence				
No	995	55 [5.5]	Reference	
Yes	792	69 [8.7]	1.6 [1.0 – 2.7]	0.065
Age				
15–24	433	29 [6.7]	Reference	
25–34	804	64 [8.0]	1.2 [0.7 – 2.1]	0.477
35–49	552	31 [5.6]	0.8 [0.4 – 1.6]	0.570
Education				
No education	207	11 [5.4]	Reference	
Primary education	1,053	73 [7.0]	1.3 [0.5 – 3.2]	0.556
Secondary education	420	27 [6.5]	1.2 [0.5 – 3.3]	0.695
Higher education	110	12 [10.9]	2.1 [0.6 – 7.5]	0.246
Occupation				
Not working	622	33 [5.4]	Reference	
Working at home	636	42 [6.7]	1.3 [0.7 – 2.3]	0.465
Working away	526	44 [8.5]	1.6 [0.9 – 2.9]	0.094
Family planning				
No method	969	83 [8.6]	Reference	
Non-barrier methods	788	33 [4.2]	0.5 [0.3 – 0.8]	0.006
Barrier methods (condoms)	33	7 [21.9]	3.0 [0.9 – 9.7]	0.072

Continued...

Table 2—Continued

Background Characteristics	Number of women	Frequency of HIV [percent]	Crude OR [95 percent C.I.]	P-value
Wealth Index				
Poor	546	31 [5.7]	Reference	
Middle	526	29 [5.5]	1.0 [0.5 – 1.8]	0.905
Rich	717	64 [9.0]	1.6 [0.9 – 2.9]	0.098
Residence				
Urban	430	39 [9.2]	Reference	
Rural	1,360	85 [6.2]	0.7 [0.4 – 1.1]	0.135
Partner/Spouse alcohol consumption				
No	1,165	75 [6.5]	Reference	
Yes	622	49 [7.8]	1.2 [0.8 – 2.0]	0.391
Polygyny				
Monogamous relationship	1,559	93 [6.0]	Reference	
Polygynous relationship	209	30 [14.5]	2.7 [1.6 – 4.3]	<0.001
Province				
Nairobi	133	14 [10.1]	Reference	
Central	197	7 [3.5]	0.3 [0.1 – 0.9]	0.034
Coast	147	11 [7.2]	0.7 [0.3 – 1.7]	0.409
Eastern	305	9 [3.1]	0.3 [0.1 – 0.9]	0.033
Nyanza	300	44 [14.5]	1.5 [0.7 – 3.3]	0.316
Rift Valley	478	20 [4.2]	0.4 [0.1 – 1.1]	0.064
Western	174	19 [11.2]	1.1 [0.5 – 2.6]	0.798
North Eastern	54	1 [1.5]	0.1 [0.0 – 0.6]	0.010

In the multivariable analysis, there was poor evidence of an association between any form of GBV and HIV infection (AOR [95 percent CI], p-value; 1.3 [0.7 – 2.6], p=0.372). Poor evidence of an association was also found between emotional (p=0.956) and sexual (p=0.766) violence and HIV infection, and weak evidence of an association was observed between physical violence and HIV infection. After controlling for other covariates, the analysis showed that women who had ever experienced physical violence had almost twice the odds of having HIV infection compared with those who had not experienced physical violence. However, the association was not statistically significant (AOR [95 percent CI], p-value; 1.8 [0.9 – 3.6], p=0.093). Polygyny and region of the country negatively confounded the effect of any violence on HIV infection.

Even after controlling for other covariates, contraceptive use and polygyny retained their association with HIV infection. Women using non-barrier methods had half the odds of having HIV infection compared with women not using any contraceptive method (AOR [95 percent CI], p-value; 0.5 [0.3 – 0.9], p=0.015). Women in polygynous relationships had twice the odds of having HIV infection compared with women in monogamous relationships (AOR [95 percent CI], p-value; 2.3 [1.5 – 3.7], p<0.001). Wealth index was also associated with HIV infection after controlling for other covariates. Women in the rich tercile had almost three-fold higher odds of having HIV infection compared with women in the poor tercile (AOR [95 percent CI], p-value; 2.6 [1.1 – 5.9], p=0.028). Polygyny and contraceptive use increased the independent effect of wealth index on HIV infection.

Table 3: Multivariable analysis to describe the independent associations of the different types of Gender Based Violence (GBV) after adjusting for other risk factors, on HIV infection amongst married women in Kenya, KDHS 2008 - 09 (Weighted N=1789)

Background Characteristics	Emotional			Sexual			Physical			Any	
	AOR [95 percent C.I.]	P-value	AOR [95 percent C.I.]	AOR [95 percent C.I.]	P-value	AOR [95 percent C.I.]	P-value	AOR [95 percent C.I.]	P-value	AOR [95 percent C.I.]	P-value
Gender-based violence											
Emotional violence											
No	Reference		Reference			Reference					
Yes	1.0 [0.6 – 1.7]	0.956	1.1 [0.6 – 1.9]		0.766	-					-
Sexual violence											
No	-		-			1.8 [0.9 – 3.6]		0.093			
Yes	-		-								
Physical violence											
No	-		-								
Yes	-		-								
Any violence											
No	-		-								
Yes	-		-								0.372
Age											
15–24	Reference		Reference			Reference					
25–34	1.2 [0.7 – 2.2]	0.443	1.2 [0.7 – 2.2]		0.451	1.2 [0.7 – 2.1]		0.520		Reference	0.496
35–49	0.8 [0.4 – 1.5]	0.463	0.8 [0.4 – 1.5]		0.467	0.8 [0.4 – 1.5]		0.480		0.8 [0.4 – 1.5]	0.464
Education											
No education	Reference		Reference			Reference				Reference	
Primary education	0.8 [0.3 – 2.2]	0.680	0.8 [0.3 – 2.2]		0.682	0.9 [0.3 – 2.6]		0.782		0.8 [0.3 – 2.4]	0.729
Secondary education	0.6 [0.2 – 1.9]	0.371	0.6 [0.2 – 1.9]		0.372	0.7 [0.2 – 2.5]		0.568		0.6 [0.2 – 2.2]	0.474
Higher education	0.7 [0.1 – 4.0]	0.710	0.7 [0.1 – 4.0]		0.718	0.9 [0.1 – 4.9]		0.856		0.8 [0.1 – 4.5]	0.787
Occupation											
Not working	Reference		Reference			Reference				Reference	
Working at home	1.4 [0.7 – 2.7]	0.286	1.4 [0.7 – 2.7]		0.286	1.4 [0.7 – 2.8]		0.290		1.4 [0.7 – 2.7]	0.308
Working away	1.4 [0.7 – 2.6]	0.321	1.4 [0.7 – 2.6]		0.328	1.4 [0.7 – 2.6]		0.309		1.4 [0.7 – 2.6]	0.331
Family planning											
No method	Reference		Reference			Reference				Reference	
Non-barrier methods	0.5 [0.3 – 0.9]	0.015	0.5 [0.3 – 0.9]		0.015	0.5 [0.3 – 0.8]		0.013		0.5 [0.3 – 0.9]	0.015
Barrier methods (condoms)	1.8 [0.4 – 7.0]	0.419	1.8 [0.4 – 7.0]		0.426	2.0 [0.5 – 8.0]		0.332		1.8 [0.5 – 7.3]	0.395
Wealth Index											
Poor	Reference		Reference			Reference				Reference	
Middle	1.2 [0.6 – 2.3]	0.623	1.2 [0.6 – 2.3]		0.619	1.2 [0.6 – 2.4]		0.609		1.2 [0.6 – 2.3]	0.591
Rich	2.6 [1.1 – 6.0]	0.025	2.6 [1.1 – 6.0]		0.025	2.6 [1.1 – 5.9]		0.027		2.6 [1.1 – 5.9]	0.028
Residence											
Urban	Reference		Reference			Reference				Reference	
Rural	0.8 [0.3 – 2.2]	0.728	0.8 [0.3 – 2.2]		0.729	0.8 [0.3 – 2.1]		0.659		0.8 [0.3 – 2.2]	0.717

Continued...

Table 3—Continued

Background Characteristics	Emotional		Sexual		Physical		Any	
	AOR [95 percent C.I.]	P-value	AOR [95 percent C.I.]	P-value	AOR [95 percent C.I.]	P-value	AOR [95 percent C.I.]	P-value
Partner/Spouse alcohol consumption								
No	Reference		Reference		Reference		Reference	
Yes	1.3 [0.8–2.1]	0.336	1.3 [0.8–2.1]	0.352	1.2 [0.7–2.0]	0.522	1.2 [0.7–2.1]	0.426
Polygyny								
Monogamous relationships	Reference		Reference		Reference		Reference	
Polygynous relationships	2.4 [1.5–3.8]	<0.001	2.4 [1.5–3.8]	<0.001	2.3 [1.4–3.7]	0.001	2.3 [1.5–3.7]	<0.001
Province								
Nairobi	Reference		Reference		Reference		Reference	
Central	0.5 [0.2–1.9]	0.337	0.5 [0.2–1.9]	0.338	0.6 [0.2–2.0]	0.372	0.5 [0.2–1.9]	0.323
Coast	0.7 [0.3–1.8]	0.416	0.7 [0.3–1.7]	0.416	0.7 [0.3–1.9]	0.496	0.7 [0.3–1.7]	0.379
Eastern	0.5 [0.2–1.3]	0.395	0.5 [0.1–2.3]	0.392	0.5 [0.1–2.2]	0.387	0.5 [0.1–2.1]	0.345
Nyanza	2.3 [1.0–5.1]	0.203	2.0 [0.7–5.9]	0.211	1.8 [0.6–5.0]	0.282	1.8 [0.6–5.4]	0.270
Rift Valley	0.6 [0.2–1.3]	0.369	0.6 [0.2–1.9]	0.363	0.6 [0.2–1.9]	0.346	0.5 [0.2–1.8]	0.325
Western	1.9 [0.8–4.5]	0.299	1.8 [0.6–5.1]	0.306	1.6 [0.6–4.6]	0.396	1.6 [0.5–4.8]	0.388
North Eastern	0.2 [0.0–1.0]	0.055	0.2 [0.0–1.0]	0.056	0.2 [0.0–1.0]	0.056	0.2 [0.0–1.0]	0.052

DISCUSSION

The primary aim of this study was to explore if, in the Kenyan context, there is an association between GBV and HIV infection. The study found that the prevalence of HIV infection was generally higher among married women who had experienced GBV compared with women who had not experienced GBV. The same association was observed when the individual components of GBV (physical, sexual, and emotional) were considered separately. However, in the multivariable analysis controlling for other risk factors, the study found no significant association between GBV and HIV infection. The same was observed when the association between each of the three components of GBV and HIV infection was assessed separately, while controlling for other risk factors.

Even though GBV can directly lead to HIV infection, the findings of this study show that GBV is not significantly associated with HIV infection among married women. These findings do not agree with several other studies on the relationship between GBV and HIV (Jewkes et al., 2010; Fonck et al., 2005; and Silverman et al., 2008)⁴. Conversely, this study reached the same conclusion on Kenya as a multi-country study investigating the same subject reached, using the 2003 KDHS data (Harlinget al., 2010). The multi-country study, which used nationally representative data, found that GBV is not consistently associated with HIV infection in low-income countries and therefore recommended that more studies be undertaken to enhance understanding of the circumstances that affect the relationship between the two variables.

In the present study, a total of nine other risk factors for HIV infection were assessed alongside GBV. After controlling for other covariates, six of these factors—age, education, occupation, residence, partner/spouse alcohol consumption, and region—did not show any significant association with HIV infection. The multivariable analysis further showed that women in polygynous marriages have more than two-fold higher odds of HIV infection compared with women in monogamous marriages. This result could be explained by the fact that polygyny is a predisposing factor for HIV infection. Similar findings have been reported in a cross-sectional study in Malawi Reiners and Tffaily, 2008).

A somewhat perplexing finding is that married women who use non-barrier contraceptive methods have half the odds of HIV infection compared with women who do not use any contraception. Non-barrier methods do not provide protection against HIV infection *per se*, and other studies have even suggested that use of hormonal non-barrier methods actually increases the risk of HIV infection. These studies account for the differences in HIV infection among users and non-users of hormonal methods by stating that there could be biases in the survey designs, as well as important differences between the two groups (FHI 360, 2012). Clearly, more studies on the association between contraceptive use and HIV infection need to be undertaken to identify and explain the underlying factors.

This study has some limitations that should be taken into consideration when interpreting the results. First, the data used for this study are from a cross-sectional survey and therefore cannot establish a causal relationship between GBV and HIV infection, but only an association

between the two variables. It is also not possible to know whether the occurrence of GBV preceded the HIV infection, or *vice versa*. Availability of this information could have helped to explain the findings. Also, in the survey GBV is self-reported. Given the sensitive nature of GBV, it is quite possible that the results, as in other GBV-related studies, could be biased due to underreporting by respondents as a result of feelings of stigma, shame, self-blame, mistrust, and fear that are usually associated with GBV.

The limitations mentioned above notwithstanding, results of this study have implications for both GBV and HIV programming. The lack of an association between GBV and HIV in our setting may suggest that these two public health concerns may be tackled independently at the policy level. However, to conclusively delineate the association between GBV and HIV infection, more studies are needed, preferably longitudinal in nature. Our findings also highlight the need for further exploration of the associations between wealth, polygyny, and non-barrier contraceptive methods and HIV infection.

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Regional Variations in Contraceptive Use in Kenya: Comparison of Nyanza, Coast, and Central Provinces

Murungaru Kimani

Milton Njeru¹

Gathari Ndirangu²

Corresponding author: Murungaru Kimani, Population Studies and Research Institute, University of Nairobi, P.O. Box 30197- 0100, Nairobi, Kenya.

¹ Jhpiego-Kenya, Nairobi.

² Division of Reproductive Health (DRH)/Capacity Kenya Project, Nairobi, Kenya.

ABSTRACT

Regional variations in contraceptive use exist among Central, Nyanza, and Coast provinces in Kenya. Responses from currently married, fecund women who participated in the 2008-09 Kenya Demographic and Health Survey (KDHS) were analyzed. Analysis confirmed a higher use of contraception in Central province compared with Nyanza and Coast provinces.

Current use of modern contraceptive methods in Central is 70 percent compared with 39 percent and 37 percent for Nyanza and Coast, respectively. The higher contraceptive use in Central province is attributed to the better socioeconomic and cultural environment that exists compared with the environments in the other two provinces. Central province has very few cases of women with no education, a much lower percentage of women in the poorest wealth category, and the highest proportion of women in monogamous unions. The higher socioeconomic status and better cultural environment have in turn created a favorable environment for the use of contraception through the intervening variables of knowledge of family planning and fertility preferences. Central province has the highest proportion of women who do not desire to have another birth and also the highest proportion of those with knowledge of contraceptive methods.

The study findings suggest that differences in contraceptive use among the three provinces could be narrowed by increasing the level of education in Coast province and overcoming traditional practices such as polygyny in both Nyanza and Coast provinces. Although mortality is still important, its effect has declined. An important finding is that use of contraception is highest among women with two to three children, which suggests the spread of the small-family size norm in Kenya. However, the unexpected finding that contraceptive use is now higher in rural areas of Central and Nyanza provinces suggests further research to understand what could be responsible for the reversal of contraceptive use being lower in rural areas compared with urban areas in the two provinces.

INTRODUCTION

The use of contraception has the potential to reduce maternal mortality and infant deaths through increased birth spacing and avoidance of high-risk pregnancies. It also has the potential to slow the rate of population growth, thereby contributing to reduction of poverty and hunger (WHO, 2010). The ministries of Health in Kenya aim to increase contraceptive prevalence from the current 46 percent to 56 percent by the year 2015 (Ministry of Medical Services and Ministry of Public Health and Sanitation).

Although contraceptive use in Kenya has been increasing over the years, substantial regional differences have persisted. The 2008-09 Kenya Health Demographic and Health Survey (KDHS) shows that, while the prevalence of modern contraceptive use in Central and Nairobi provinces is comparable to the levels in developed countries, it is extremely low in North Eastern province, at only 3 percent among married women. Three possible explanations for these differences have been suggested, namely socioeconomic, cultural, and the impact of family planning programs (Clements et al., nd). Evidence from research conducted in Kenya and elsewhere has provided empirical evidence to support these suggestions (Kimani and K'Oyugi, 2004).

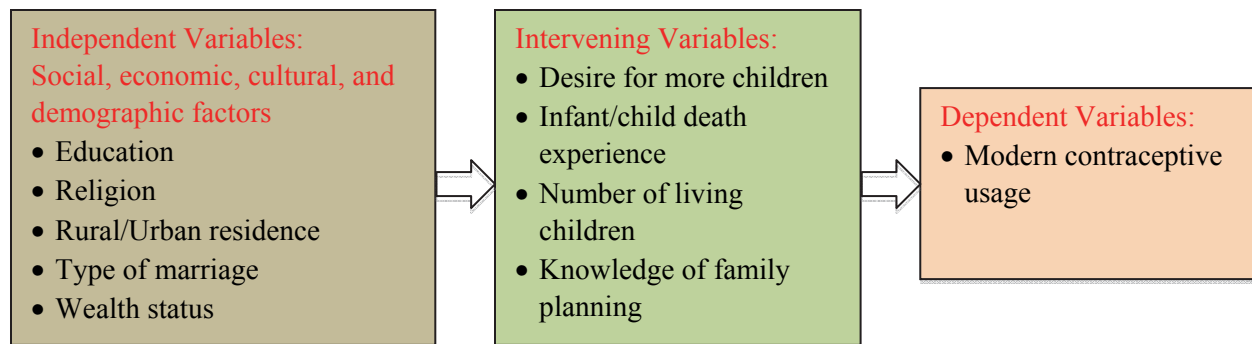
In this study we use data from the 2008-09 KDHS to investigate regional variation in modern contraceptive use among married women at risk of becoming pregnant and to demonstrate the influence of socioeconomic, demographic, and cultural factors. The study focuses on Coast, Nyanza, and Central provinces, where there are substantial differences in the use of modern contraceptive methods among married women. Central province has the highest contraceptive prevalence, at 70 percent, while Nyanza and Coast provinces are much lower, at 39 percent and 37 percent, respectively (KNBS and ICF Macro, 2010). Specifically, the study analyzes socioeconomic, cultural, and demographic factors that may have contributed to the observed differences in contraceptive use in the three regions. We test the hypothesis that differences in these factors within the three regions could explain the variation in levels of modern contraceptive use.

The choice of these three provinces is justified by a number of considerations. The three regions fall within the 20 percent high-potential areas of Kenya in which the Kenyan population is concentrated. Previous research has also demonstrated the potential use of the analysis in the formulation of regional strategies for the enhancement of contraceptive use in these regions. Kimani and K'Oyugi (2004), for example, showed that promotion of education in Coast and reduction of infant and child mortality in Nyanza would enhance the use of contraception in these regions. In addition, both Nyanza and Central provinces are comparable in terms of infrastructure, population distribution, religion, and availability of services. For example, most of the populations in the two provinces reside in the rural areas. Population density is also high in both provinces. Similarly, results from the 2010 Kenya Services Provision Assessment (KSPA) survey showed that 89 percent of the sampled health facilities in Central offered some type of temporary contraceptive methods, which is comparable to the 93 percent in Nyanza (NCAPD et al., 2011). In contrast, these variables are very different in Coast province, which has a

substantial proportion of Muslims compared with Central and Nyanza provinces, with their much higher proportions of Christians.

Figure 1 shows the conceptual framework that guided the study. This framework can be perceived as a component within the Bongaarts (1978) proximate determinants framework for the analysis of fertility. However, since the focus of this study is limited to contraception, we did not consider the other proximate determinants of fertility identified by Bongaarts. Instead, the framework for this study has introduced intervening variables that are considered to have a direct influence on use of contraception. The assumption is that the background socioeconomic, cultural, and demographic variables create environments that, through the intervening variables, either favour or restrain the practice of contraception.

Figure 1
Conceptual framework



DATA AND METHODS

Data for the study were obtained from the 2008-09 KDHS, a nationally representative sample consisting of 8,444 women age 15-49. The design of the survey and the specific questions that were covered are detailed in the KDHS 2008-09 report (KNBS and ICF Macro, 2010). The analysis was limited to 3,708 currently married women age 15-49 at risk of becoming pregnant, that is, excluding women who were pregnant or infecund. The sample also excluded 65 cases; 64 of these cases were excluded because they did not have information on types of marriage, and another case lacked information on religion.

The dependent variable for the study is current use of modern methods of contraception, including sterilization. As observed by Dodoo (1995), modern methods of contraception, which are more effective than traditional methods, are the focus of most national family planning programs, including those in Kenya. Several socioeconomic, cultural, and intervening variables that have been found to be associated with contraceptive use and that are considered key explanatory variables for differences in contraceptive use were included, as indicated in the conceptual framework.

The key socioeconomic variables were residence, education, and wealth index. Residence was assigned an urban or rural category, while education was categorized as none, primary, and secondary and above. However, in Central and Nyanza, two education categories, none and primary, were combined because of the limited number of cases of women with no education. Similarly, the wealth index was divided into three categories: poorest, middle, and wealthiest, rather than the usual wealth quintiles (poorest, poorer, middle, richer, richest) because of the few cases in Central among the poorest category.

Type of marriage (monogamous/polygynous) was used as a proxy for cultural differences among the three regions. To capture the influence of religion on contraceptive use, religious affiliation was categorized as Christian, Muslim, and Other/None.

Intervening variables include fertility preference, death of infant and/or child, number of living children, and knowledge of modern family planning methods. Women were categorized by whether they desired more children or not. The former category included women who desired a child within two years or after two years, and also women who were undecided. Studies in Kenya, as elsewhere, have shown that women who desire no more children are more likely to use contraception (Kimani, 2007). The infant mortality variable categorized women into categories of those who had lost at least one infant or child in the five years prior to the survey and those who had not. Women in the former category may be less likely to use contraception compared with those in the latter category because of replacement and insurance effects, as suggested by studies in Kenya and elsewhere (Kimani, 2001). Women who knew of fewer than seven modern contraceptive methods were categorized as having a low level of family planning knowledge, and women who knew of at least seven methods were classified as having high knowledge.

Both bivariate and multivariate analyses were performed. Bivariate analysis was performed through cross-tabulation to provide comparative associations between modern contraceptive use and the socioeconomic, cultural, and demographic variables and intervening variables for the three regions and at the national level. Multivariate analysis was performed using logistic regression. Four logistic regression models, one for each of the regions and at the national level, were fitted and the effects of the various variables were compared. However, both religion and family planning knowledge variables were excluded from the regressions. In Central and Nyanza, which are predominantly Christian, the samples included few Muslims. Furthermore, estimates based on models that excluded this variable at the national and Coast province levels were similar. The knowledge variable was excluded because the results would have been difficult to interpret, as the effects could be in either direction. On the one hand, women could be expected to use contraception because of their knowledge of family planning methods, but on the other hand, women with family planning knowledge could have obtained this knowledge when they went to seek family planning services.

RESULTS

Table 1 summarizes the percent distributions among married, fecund, nonpregnant women for the three regions, Central, Coast, and Nyanza, as well as at the national level, according to the study conceptual framework. Use of modern contraceptives is substantially higher in Central (70 percent) compared with Coast (37 percent) and Nyanza (39 percent), and the national level is 46 percent. The table also shows substantial regional differences in the distributions of the socioeconomic, cultural, demographic, and intervening variables.

The level of education among women is high in both Central and Nyanza provinces, and is comparable to the national level, but education is much lower in the Coast. In Central and Nyanza, very few women have no education compared with 25 percent of women living in Coast province and slightly over 9 percent of women at the national level. The level of household wealth is higher in Central compared with the other two regions. In Central, less than 10 percent of women are in the poorest wealth category compared with nearly 43 percent in Nyanza and 33 percent in Coast. The proportion of women residing in urban areas is much higher in Coast compared with the other two regions and the national level.

Cultural conditions in the three regions also differ. Polygynous marriages are more common in Nyanza, at 19 percent, compared with 3 percent in Central province, which is also substantially lower than the national percentage, at 12 percent. In Central and Nyanza provinces, Christians predominate, at over 98 percent, while Muslims constitute 34 percent of the population in Coast.

Compared with Coast and Nyanza provinces, survey respondents in Central province are older, with 41 percent of women age 35 or older compared with 25 percent in Nyanza and 24 percent in Coast. In all the three regions, the majority of women have two to three living children, while at the national level the proportion with four or more living children is marginally higher.

Finally, Table 1 shows differences in the regional distributions in the intervening variables. In both Nyanza and Coast provinces, more than half of women desire to have an additional birth, at 52 percent in Nyanza and 62 percent in Coast compared with 37 percent in Central. The proportion of women who have experienced the death of at least one child in the five years preceding the survey is more than double in Nyanza compared with the other two regions and with the national level. Coast province has the highest proportion of women who desire to have additional children, while Central has the lowest proportion. Knowledge of contraception is highest among women in Central province, at 91 percent, while in the other two provinces the levels are below 70 percent, similar to the national average.

Table 1: Percent distribution of currently married, fecund, nonpregnant women 15-49 in Central, Nyanza, and Coast provinces, and for Kenya, KDHS 2008-09 by background characteristics

	Central	Nyanza	Coast	Kenya
	Percent			
Current use of modern contraception				
Not using	29.6	61.3	63.5	53.6
Currently using	70.4	38.7	36.5	46.4
Type of place of residence				
Urban	15.8	11.3	54.8	24.0
Rural	84.2	88.7	45.2	76.0
Education level				
None			25.0	9.2
Primary ¹	62.9	69.8	47.6	58.6
Sec ²	37.1	30.2	27.4	32.2
Wealth Terciles				
Poorest	9.6	42.7	32.5	34.2
Middle	52.2	36.8	16.1	32.9
Wealthiest	38.2	20.5	51.4	32.9
Type of marriage				
Monogamous	97.1	81.3	88.0	88.3
Polygynous	2.9	18.7	12.0	11.7
Religion				
Christians	98.7	98.3	56.7	90.3
Muslims			34.1	7.0
None/Other ²	1.3	1.7	9.2	2.7
Age				
15-24	17.5	31.9	32.1	23.7
25-34	41.4	43.1	44.3	44.8
35+	41.1	25.0	23.7	31.5
Desire for Children				
Wants more	36.5	51.6	61.5	46.3
Does not	63.5	48.4	38.5	53.7
Whether any child died in last 5 years				
No death	94.9	85.7	93.0	92.6
Had a death	5.1	14.3	7.0	7.4
Living Children				
0-1	19.5	19.8	26.2	18.3
2-3	45.1	40.6	38.7	40.5
4 +	35.4	39.6	35.2	41.2
FP Knowledge				
Low	8.6	32.0	38.2	33.1
High	91.4	68.0	61.8	66.9
Total %	100	100	100	100
Total N	416	625	307	3708

¹ Includes no education in Central and Nyanza

² Includes Muslims in Central and Nyanza

Table 2 summarizes the association between contraceptive use and socioeconomic, cultural, and demographic and intervening variables in each province, as well as at the national level. Contraceptive use increases with women's education and wealth, in the three regions and at the national level. At the national level, for example, contraceptive use among women with a secondary and above level of education is 58 percent compared with 15 percent among women with no education. Similarly, contraceptive use is 56 percent among women in the wealthiest category compared with 30 percent in the poorest. These patterns are similar among the three regions. Although contraceptive use is higher in the urban areas of Coast province and at the national level, the reverse is the case in Central and Nyanza, although these associations are not

statistically significant. In Central, contraceptive use is 71 percent in rural areas compared with 65 percent in urban areas. By type of marriage, in the three regions and at the national level, use of modern contraception is significantly higher among women in monogamous unions, except in Nyanza, where the association is not statistically significant. Also, contraceptive use is higher among Christians than among Muslims.

Table 2: Percentage of currently married, fecund, nonpregnant women 15-49 currently using modern contraceptives in Central, Nyanza, and Coast provinces and for Kenya, KDHS 2008-09 by background characteristics

	Central			Nyanza			Coast			Kenya		
	Percent	P-Value	N	Percent	P-Value	N	Percent	P-Value	N	Percent	P-Value	N
Type of place of residence												
Urban	64.8	0.281	66	36.9	0.741	70	46.5	0.000	168	55.0	0.000	891
2 Rural	71.4	-	351	38.9	-	555	24.3	-	139	43.7	-	2,817
Education level												
None	*	0.002	0		0.000	10	19.5	0.000	77	15.1	0.000	342
Primary	65.0	-	262	33.9	-	427	34.4	-	146	44.8	-	2,173
Sec +	79.5	-	155	49.8	-	189	55.6	-	84	58.3	-	1,193
Wealth terciles												
Poorest	[65.5]	0.452	40	33.9	0.103	267	17.7	0.000	100	30.2	0.000	1,268
Middle	73.0	-	217	42.3	-	230	39.4	-	49	53.3	-	1,221
Wealthiest	68.0	-	159	42.1	-	129	47.4	-	158	56.4	-	1,220
Type of marriage												
Monogamous	71.2	0.038	404	39.5	0.390	509	38.8	0.021	270	48.2	0.000	3,273
Polygynous	*	-	12	35.2	-	117	19.4	-	37	32.6	-	435
Religion												
Christians	71.1	0.007	411	38.9	0.437	615	45.6	0.000	174	49.1	0.000	3,347
Muslims		-	-	-	-	-	28.8	-	105	23.1	-	260
None/Other	*	-	6	*	-	12	[8.5]	-	28	17.9	-	101
Age												
15-24	57.3	0.027	73	28.0	0.001	200	33.2	0.114	99	35.5	0.000	880
25-34	73.4	-	172	42.4	-	270	42.7	-	136	50.6	-	1,661
35+	72.8	-	171	45.8	-	157	29.3	-	73	48.7	-	1,167
Desire for Children												
Wants more	65.4	0.096	152	29.4	0.000	323	33.9	0.231	189	39	0.000	1,716
Does not	73.2	-	264	48.6	-	303	40.6	-	118	52.8	-	1,993
Whether any child died in last 5 years												
No	71.2	0.127	395	40.5	0.022	536	36.8	0.715	286	47.5	0.000	3,432
Yes	[55.7]	-	21	27.8	-	90	[32.8]	-	22	33.1	-	276
Living children												
0-1	57.6	0.000	81	30	0.004	124	35.2	0.001	80	38.5	0.000	678
2-3	81.2	-	188	35.5	-	254	48.7	-	119	53.9	-	1,503
4+	63.7	-	148	46.3	-	248	23.9	-	108	42.5	-	1,527
FP knowledge												
Low	[58.0]	0.09	36	26.5	0.001	200	24.8	0.001	117	31	0.000	1,228
High	71.5	-	380	44.4	-	426	43.7	-	190	54	-	2,480
Current use of modern contraceptives												
	70.4	-	416	38.7	-	626	36.5	-	307	46.4	-	3,708

Note: P-Value is based on Chi-Square test of percent using modern contraceptives in each region and the whole of Kenya.

[] 25-49 unweighted cases.

* Less than 25 unweighted cases.

¹ Includes None in Central and Nyanza.

² Includes Muslims in Central and Nyanza.

Concerning the association between contraceptive use and the intervening variables, in the three regions and nationally, contraceptive use is higher among women who do not desire more children. However, this relationship is not significant in Coast province. Similarly, among women who experienced a child death in the five years preceding the survey, a lower proportion uses contraception compared with women who did not experience a recent child death, although

this relationship is only significant at the national level and in Nyanza. In all three regions and nationally, contraceptive prevalence is higher among women who know at least seven modern methods of contraception. Generally, contraceptive use is highest among women age 25-34 and among women with two to three living children, except in Nyanza, where contraceptive use increases with women's age and number of living children.

Table 3 summarizes the logistic regression results. After controlling for the other factors in the model, socioeconomic and cultural factors are significantly associated with contraceptive use at the national level. Use of contraception increases with levels of women's education, and the same pattern is observed with respect to the wealth index. Contraceptive use is also higher among women in monogamous marital unions. Also, after controlling for the effects of the other factors in the model, the intervening variables are significantly associated with contraceptive use at the national level. Women who do not desire another birth are more likely to use contraception. Contraceptive use is higher among women who did not experience a child death in the five years before the survey. Use of contraception is highest among women age 25-34 and among those with two to three children. Living in an urban area of Kenya, however, is not associated with higher use of contraception.

Similar to the bivariate analysis, in the multivariate analysis the factors associated with contraceptive use in the three regions are not as strong as at the national level. Indeed, in Central region, where the level of contraceptive use is comparable to that in developed countries, contraceptive use is only associated with women's education, type of marriage, and age. Contraceptive use is higher among women with secondary and above education compared with those with no education or primary education. It is higher among women in monogamous unions compared with women in polygynous unions, and higher among women age 35 or older compared with the reference group (women age 15-24). In Nyanza province, contraceptive use is only associated with women's education and fertility preferences. In Coast province, contraceptive use is only significantly associated with living children, with use being highest among women with two to three children.

DISCUSSION

This study confirms the existence of substantial regional variations in contraceptive use in Kenya. Consistent with previous DHS results, it shows a higher level of modern contraceptive use in Central province compared with both Coast and Nyanza provinces, and also shows use above the national average. Overall, the results reveal that women in Central province are of higher socioeconomic status compared with women in the other two regions. Central province has very few cases of women with no education and also has a much lower percentage of women in the poorest wealth category compared with the other two provinces studied. Similarly, Central seems to be less culturally conservative, as reflected in the higher proportion of married women in monogamous unions compared with the other two regions.

The better socioeconomic and cultural environment in Central province seems in turn to have a positive impact on the intervening variables. Central province has the most favourable environment for the use of contraception, as suggested by the higher proportion of women who do not desire to have another birth and the higher level of knowledge about family planning compared with the other two provinces. Other studies of Kenya have reported similar findings (Kimani and K'Oyugi, 2004).

The analysis shows that contraceptive use is generally positively associated with socioeconomic status, less cultural conservatism, and a favourable environment for the use of contraception, as reflected by the intervening variables. Women in monogamous unions who can be considered to be less conservative are associated with higher levels of contraceptive use, except in Nyanza. This is consistent with the observed regional differences in contraceptive use, particularly between Central and Nyanza, and especially in view of the larger proportion of monogamous marriages in Central. Women who do not desire another birth are also more likely to use contraception, except in the Coast. This association is consistent with the observed regional differences, particularly between Central and Coast. Finally, the greater use of contraception among women with more knowledge of contraceptives in Central compared with the other two regions is also consistent with the observed regional differences.

The logistic regression results show that socioeconomic development and cultural conditions are important factors in the use of contraception in Kenya. This finding is consistent with demographic transition theory, which suggests that socioeconomic development is the driving force for fertility control. Socioeconomic development in turn seems to have shaped attitudes towards family planning and fertility preferences in Kenya. As expected, women who do not desire to have another birth are more likely to use contraception than other women. The observation that use of contraception is highest among women with two to three children suggests that Kenyan women are not only desiring smaller families but also taking deliberate action to realize their fertility preferences by using modern contraceptive methods.

An unexpected result is that urban residence is not associated with higher contraceptive prevalence, net of other factors. Although contraceptive use is higher in urban areas than rural areas of Coast province and at the national level, this is not the case in Central and Nyanza,

although the associations are not statistically significant. This finding is inconsistent with previous analyses that have suggested the presence of lower fertility and higher contraceptive use in urban areas. Our preliminary analysis at the regional level seems to imply that urban areas do not necessarily provide a better environment for the use of contraception. Related to this finding, the 2008-09 KDHS showed that infant mortality was higher in urban areas compared with rural areas at the national level (KNBS and ICF Macro, 2010).

The persistence of regional differences in contraceptive use in the presence of statistical controls seems to imply the omission of some key variables. For example, previous studies (Population Council, 1998; Kimani, 2007) have shown that both respondents' approval of family planning and discussions with the spouse about family are important, although these variables are not available in the 2008-09 KDHS.

The logistic regressions for the three regions show that the effects of the various factors on contraceptive use differ among these regions. Education is an important predictor of contraceptive use both in Central and Nyanza. This seems to suggest that increases in the levels of education in the Coast would result in higher levels of contraceptive use. The persistence of cultural practices such as polygynous marriages could also be contributing to regional differences, as this practice is still prevalent in Nyanza and the Coast. The effect of the type of marriage still persists (results not shown) even when religion is controlled for, hence confirming its independent effect. However, the importance of desired family size on contraceptive use in the Coast could also be contributing to the differences. The proportion of women who desire to have another birth is substantial in this region in particular.

The lower use of contraception at the national level observed among women who experienced a child death in the five years before the survey confirms that child mortality is still an important factor associated with the demographic transition in Kenya. However, its importance seems to have been declining, particularly at the regional level. In the three regions in our study, the experience of a child's death is not significantly associated with contraceptive use, after controlling for the other factors.

CONCLUSION

The better socioeconomic and cultural environment in Central province could be responsible for the higher use of contraception observed in this province in comparison with Nyanza and Coast, and hence with the observed regional differences in the use of modern methods of contraception. The higher use of contraception in Central arises from the favourable environment for the use of family planning, as reflected in the intervening variables. As the analysis reveals, the motivation to have additional births and the experience of child deaths are lower in Central than in the other two provinces, while women in the Central province also have the highest levels of knowledge on family planning methods. Thus, continued progress in socioeconomic development, abandonment of traditional practices, and reduction of infant and child mortality would promote the level of contraceptive use at the national level, and also reduce regional differences in contraceptive use.

The other important conclusion is that contraceptive use has spread even among women with small families, which suggests increasing acceptance of the small family norm in Kenya. Our final observation relates to the finding that urban areas in Kenya may no longer provide a better environment for contraceptive use compared with rural areas. The fact that in some regions use of contraception is higher in rural areas compared with urban areas suggests the need for further research to understand what could be responsible for this apparent reversal.

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Determinants of Postnatal Care Use in Kenya

Daniel Akunga

Diana Menya¹

Mark Kabue²

Corresponding Author: Daniel Akunga, Department of Environmental Health, School of Public Health, Kenyatta University, Nairobi, Kenya.

¹ Department of Epidemiology and Nutrition, School of Public Health, Moi University, Eldoret, Kenya.

² Department of Monitoring, Evaluation, and Research, Jhpiego-Kenya, Nairobi, Kenya.

ABSTRACT

BACKGROUND

Worldwide, more than 500,000 women die annually from complications related to pregnancy. About 60 percent of maternal deaths occur within the first 48 hours of delivery. Most occur in developing countries, and most are due to postpartum hemorrhage. Studies have shown that access to high-quality postnatal care (PNC) provided by skilled attendants significantly improves maternal health because it allows for early detection and management of complications, which reduces adverse pregnancy outcomes. While levels of antenatal care (ANC) use are appreciably high (92 percent), and health programs target pregnant women, PNC utilization in Kenya is still low.

OBJECTIVE

To identify the determinants of postnatal care use in Kenya

METHODS

The study was conducted using nationally representative data from the 2008-09 Kenya Demographic and Health Survey (2008-09 KDHS). Data collected using the Woman's Questionnaire, which asks about women's demographic characteristics, reproductive history, pregnancy history, and postnatal care was analysed in this study. The sub-population of interest is women who reported having a live birth in the five-year period preceding the survey.

RESULTS

About 3,970 women reported having had a birth in the five years preceding the survey. Of these, 42 percent delivered in health facilities, and 47 percent received PNC services. The majority were age 20-29 at birth of their last child, were married or living together, and lived in rural areas. Over 90 percent reported attending ANC at least once. Fifty-two percent delivered at home. Age of mother at delivery of the last child, place and region of residence, level of education, wealth index, parity, weight of child at birth, whether the child was wanted, preceding birth interval of the last child, number of ANC visits, skill of ANC provider, skill of delivery provider, and place of delivery were all significantly associated with use of PNC services ($p < 0.05$).

CONCLUSION

The use of PNC services was rather low at 47 percent as opposed to use of ANC services, mainly because hospital deliveries are low (42 percent). Our findings suggest that women with education beyond primary school, women living in urban areas, women attending at least four ANC visits, and women delivering in health facilities are more likely to use PNC services compared with other women. Surprisingly, women attended by unskilled ANC service providers reported high PNC use. In view of these findings, it is recommended that maternal health programs promote the use of postnatal services by encouraging and supporting 24-hour delivery services at level-two facilities. Establishing services for pregnant women to wait in the hospital

before the actual delivery may minimize the risk of home delivery due to emergency labour onset that requires transport to a health facility.

BACKGROUND

Postnatal care (PNC) is an important aspect of maternal and newborn care. Access to high-quality care provided by skilled attendants significantly improves maternal health because it allows for early detection of problems that could result in adverse pregnancy outcomes (Bernis, 2003). Worldwide, more than 500,000 women die annually from complications related to pregnancy (WHO, 2008). About 60 percent of maternal deaths occur within the first 48 hours of delivery (WHO, 2008). Most occur in developing countries, and most are due to postpartum hemorrhage. Other common poor maternal outcomes include infection, uterine rupture dystocia, and eclampsia (Rosmans and Graham, 2006). Kenya's maternal mortality rate of 590 per 100,000 in 1998, 414 in 2002 (CBS et al., 2004), and 448 reported in the 2008-2009 Kenya Health and Demographic Survey is unacceptably high (KNBS and ICF Macro, 2010).

Antenatal care (ANC) has improved over time because of interventions, while PNC still lags behind in many parts of the developing world. Recognition of the importance of PNC in the continuum of care for mothers, from pregnancy through delivery and post delivery, has resulted in implementation of policies aimed at improving maternal and newborn health. In Kenya it is now recommended that mothers should have at least four ANC visits, should deliver in a health facility under skilled attendance, and should have four targeted PNC visits.

Poor maternal health outcomes are caused by a combination of factors, including the level and quality of health services and the health-seeking behavior of mothers. In Kenya, over 80 percent of health facilities have the capacity to offer an adequate maternal health package through the continuum of care (NCAPD et al., 2011). Levels of ANC use (at least one visit) are appreciably high at 92 percent (KNBS and ICF Macro, 2010), and health programs targeting pregnant women are available. However, only 42 percent of deliveries were assisted by a health professional in 2003 (CBS et al., 2004); this improved to 44 percent in 2008-2009. Only 40 percent of deliveries occurred in health care facilities (CBS et al., 2004). This improved slightly to 43 percent in 2008-2009 (KNBS and ICF Macro, 2010) but is still unacceptably low. PNC utilization is very low at 47 percent, as it is in other countries, such as Nepal and Tanzania (Dhakal et al., 2007; Mwifadhi et al., 2009; Matjasevich et al., 2009), despite availability of the service.

A study on determinants of postnatal care using DHS data from 30 developing countries showed that 50 percent of all births occurred outside a health facility. Worse still, in 70 percent of deliveries with skilled attendants, the mothers did not receive any PNC. Rural residence, low levels of education, low wealth index, and poor or no antenatal care (ANC) were identified as key factors associated with non-use of PNC (Forte et al., 2006).

Postnatal care includes services provided to women and newborns immediately after delivery and up to six weeks thereafter, with the aim of ensuring optimum health for both mothers and their infants. In this paper, however, the term PNC is used to denote care related to the mother only and not to the newborn. Information regarding factors that inhibit effective use of these services in Kenya is not well documented; hence there is need for this study. The overall objective of the study is to determine factors associated with use of postnatal care so as to provide reliable data that will inform policy related to maternal health.

METHODS

STUDY DESIGN AND DATA SOURCES

The study was conducted using nationally representative data from the 2008-09 Kenya Demographic and Health Survey (KDHS). The KDHS is a population-based multistage stratified sampling survey that is carried out in many other developing countries. DHS surveys are cross-sectional in design, and women of reproductive age (15-49) and men age 15-54 are interviewed separately (KNBS and ICF Macro, 2010). This paper analyses data collected using the Woman's Questionnaire, which asks about women's demographic characteristics, reproductive history, pregnancy history, and postnatal care. The sub-population analysed in this study is women who reported having a live birth in the five-year period preceding the survey. The sampling method of the KDHS has been reported in detail elsewhere (KNBS and ICF Macro, 2010).

This study adapted and modified the Andersen behavioral model framework (Andersen, 1995) for health services use. Hence the dependent variable, PNC use, was categorized according to whether or not women received postpartum care, irrespective of the skill of the provider. Eighteen explanatory variables were placed into three major groups: mother and child characteristics, background characteristics, and health service provision factors. Although past DHS surveys provided PNC information only for births that occurred outside health facilities, current DHS surveys collect postnatal care information for all births, whether delivered in health facilities or elsewhere (Wang et al., 2011).

In the 2008-09 KDHS, a representative sample of 8,444 households participated in the survey. The sampling followed mathematically derived weights for regional representation. The KDHS survey involved all women age 15-49 who were either usual residents (*de jure*) or visitors present in selected households on the night before the survey (*de facto*).

VARIABLES

The dependent variable, PNC use, was measured based on whether a woman was checked by someone after delivery, irrespective of place of delivery and skill of the person checking her health. If this checking was reported to have occurred more than 42 days after delivery, then this was treated as receiving no PNC.

Several independent variables were used to predict PNC use. These include skill of ANC provider, skill of delivery provider, birth interval, and age of mother at the time of her last birth.

The process involved combining several individual variables into distinct categories. Skill of ANC provider was categorized as doctor, nurse/midwife, or unskilled. If a woman saw more than one ANC provider, the provider with the highest qualification was considered. Skill of delivery provider was categorized as skilled or unskilled, while age of mother at the time of her last birth was calculated based on the current age of her child. The mother's age was then grouped into four categories, below 20, 20-29, 30-39, or 40 and above. Other independent variables considered were religion, marital status, residence, region, wealth index, level of education of mother, whether pregnancy for the last child was wanted or not, size of baby, number of children ever born, weight of baby, birth interval of the preceding child, whether the mother was told about pregnancy complications during ANC, number of ANC visits, and place of delivery.

STATISTICAL ANALYSIS

The study did bivariate and multivariate analyses using SPSS version 18.0. First, descriptive statistics were done, and then the association between independent variables and PNC use was tested using Pearson's chi-square. Because the chi-squared analysis indicates associations of the selected variables without controlling for the confounding effects of other variables, the net effects of each independent variable were further examined using multivariate logistic regression analysis at the 95 percent confidence interval.

To take care of multicollinearity of two or more predictor variables, two regression models are explored in this paper. Both models control for the effects of age of mother at birth of last child, marital status, wealth index, level of education, region, residence, religion, whether youngest child was wanted, number of children ever born, number of ANC visits, place of delivery, birth interval of preceding child, skill of ANC provider, and skill of delivery provider. To avoid situations where several independently related factors collectively predict the dependent variable, the birth interval of a preceding child, skill of ANC provider, and skill of delivery provider were excluded from Model 1 as they seemed to be independently related to number of children ever born, number of ANC visits, and place of delivery, respectively. The latter three factors are in model 1, while the former three variables are in model 2 (Table 3).

RESULTS

Of the women surveyed in the KDHS, 3,973 had a birth in the five years preceding the survey. Of these, about 42 percent delivered in the health facility, and 47 percent reported receiving PNC services. Table 1 summarizes the characteristics of the women. The majority were age 20-29 at birth of the last child, were married or living together, and lived in rural areas. About 90 percent had some education, and 68 percent were Protestant. Sixty percent had parity of three or less. About half had a birth interval of 24-59 months for the preceding child. Forty-seven percent reported that they would have preferred to have the last child either later or not at all. Only 40 percent were told about signs of pregnancy complications during ANC visits. Over 90 percent reported attending ANC at least once, with those who attended four or more visits accounting for 47 percent. Over 90 percent of women were attended to by a skilled provider

during ANC, primarily a nurse or midwife. Nearly half of women delivered in a health facility, while 52 percent delivered at home.

Table 1: Characteristics of women age 15-49 with at least one birth in the five years preceding the survey, Kenya 2008-09

	Percentage	Number of mothers
Whether received PNC services (outcome variable)		
Received PNC services	52.6	1882
Did not receive PNC services	47.4	2091
Total	100.0	3973
Background characteristics		
Age of the mother at the time of delivery		
Below 20	14.2	564
20-29	55.5	2206
30-39	25.8	1025
40 and above	4.5	178
Current marital status		
Never married	9.4	372
Widowed/Separated/Divorced	9.0	356
Married/Living together	81.7	3245
Type of place of residence		
Urban	20.7	823
Rural	79.3	3150
Province of residence		
North Eastern	2.4	97
Western	11.1	442
Rift Valley	27.8	1103
Nyanza	18.4	733
Eastern	15.9	630
Coast	8.3	330
Central	9.3	371
Nairobi	6.8	269
Highest level of education		
No education	11.1	441
Primary	62.6	2486
Secondary +	26.3	1045
Wealth index		
Poorest	21.2	843
Poorer	19.2	764
Middle	18.7	742
Richer	19.3	765
Richest	21.6	859
Religion		
Roman Catholic	20.6	820
Protestant	67.9	2698
Muslim	8.0	318
No religion/Other/Missing	3.4	137
Mother's and child's characteristics		
Number of children ever born		
1 ¹	21.3	847
2	21.3	845
3	17.3	686
4+	40.1	1595

Continued...

Table 1: —Continued

	Percentage	Number of mothers
Size of last child, according to mother		
Large	32.4	1287
Average	51.8	2061
Small	15.3	607
DK/Missing	(0.5)	18
Weight of last child at birth		
Not weighed	48.5	1926
Below 2500 grams	2.8	111
2500-6500 grams	48.7	1936
Pregnancy for youngest child was wanted		
Wanted then	52.9	2101
Wanted later	26.6	1056
Not wanted at all ²	20.5	816
Birth interval of preceding child		
No prior birth ³	21.5	854
Less than 24 months	15.6	621
24-59 months	47.9	1903
More than 59 months	14.9	594
Told about complications during ANC		
Not told	52.2	2074
Told	40.2	1597
No ANC/Missing/DK ⁴	7.6	302
Health service provision factors		
Skill of ANC provider		
No ANC/Missing ⁵	7.4	293
Unskilled ANC provider	(1.1)	45
Nurse/Midwife	62.6	2486
Doctor	28.9	1148
Number of ANC visits		
DK	2.0	78
No visits/Missing ⁵	7.3	293
1	4.3	171
2-3	39.2	1559
4+	47.1	1872
Skill of delivery provider		
Unskilled ⁶	52.0	2067
Skilled	48.0	1906
Place of delivery		
Home	51.9	2064
En route/Other	1.3	52
Private health facility	11.9	471
Public health facility	34.9	1386
Total	100.0	3973

Notes: Figures in parenthesis are based on small samples and should be interpreted with caution.

¹ Excludes seven mothers who reported twin births; second twin of first birth is missing.

² Includes one mother who did not respond to the question.

³ Includes seven mothers who reported twin births; second twin of first birth is included.

⁴ Includes eight mothers who did not know whether they were told about complications during ANC and four mothers who did not respond to the question.

⁵ Includes three mothers who did not respond to the question.

⁶ Includes mothers who were delivered by traditional birth attendants, community health workers, relatives, and/or friends and no one.

Table 2 shows the summary of findings of chi-squared analysis. The following variables were significantly associated with use of PNC services ($p < 0.05$): age of mother at delivery of the last child, place and region of residence, level of education, wealth index, parity, weight of child at birth, whether the child was wanted, preceding birth interval of the last child, number of ANC visits, skill of ANC provider, told about signs of pregnancy complications during ANC, skill of delivery provider, and place of delivery.

Table 2: Postnatal care use by background characteristics among women age 15-49 who had given birth in the five years preceding the survey, Kenya 2008-09

	Percent	N	χ^2 test P-value
Background characteristics			
Age of the mother at the time of delivery			
Below 20	46.2	564	
20-29	48.3	2206	
30-39	48.0	1025	0.011
40 and above	35.6	178	
Total	47.4	3973	
Current marital status			
Never married	49.6	372	
Widowed/Separated/Divorced	42.7	356	
Married/Living together	47.6	3245	0.142
Total	47.4	3973	
Type of place of residence			
Urban	67.8	823	
Rural	42.0	3150	<0.001
Total	47.4	3973	
Province of residence			
Northeastern	20.7	97	
Western	40.0	442	
Rift Valley	48.9	1103	
Nyanza	34.2	733	
Eastern	48.5	630	<0.001
Coast	50.0	330	
Central	55.8	371	
Nairobi	81.6	269	
Total	47.4	3973	
Highest level of education			
No Education	32.7	441	
Primary	43.6	2486	
Secondary +	62.7	1045	<0.001
Total	47.4	3973	
Wealth index			
Poorest	35.4	843	
Poorer	36.3	764	
Middle	44.2	742	
Richer	50.9	765	<0.001
Richest	68.6	859	
Total	47.4	3973	
Religion			
Roman Catholic	49.4	820	
Protestant	47.1	2698	
Muslim	46.3	318	0.543
No religion/Other/Missing	44.1	137	
Total	47.4	3973	

Continued...

Table 2: —Continued

	Percent	N	χ^2 test P-value
Mother's and child's characteristics			
Number of children ever born			
1 ¹	55.7	847	
2	51.7	845	
3	48.0	686	<0.001
4+	40.4	1595	
Total	47.4	3973	
Size of last child according to mother			
Large	48.2	1287	
Average	47.5	2061	
Small	46.0	607	0.089
DK/Missing	(0.5)	18	
Total	47.4	3973	
Pregnancy for youngest child was wanted			
Wanted then	50.4	2101	
Wanted later	45.2	1056	
Not wanted at all ²	42.5	815	<0.001
Total	47.4	3973	
Weight of last child at birth			
Not weighed/Other	26.6	1926	
Below 2500 grams	72.5	111	<0.001
2500-6500 grams	66.6	1936	
Total	47.4	3973	
Birth interval of preceding child			
No prior birth ³	55.8	854	
Less than 24 months	38.4	621	
24-59 months	43.5	1903	<0.001
More than 59 months	57.2	594	
Total	47.4	3973	
Told about complications during ANC			
Not told	39.5	2074	
Told	61.8	1597	
No ANC/DK/Missing ⁴	25.4	302	<0.001
Total	47.4	3973	
Health service provision factors			
Skill of ANC provider			
No ANC/Missing ⁵	25.0	293	
Unskilled ANC provider	(52.8)	45	
Nurse/Midwife	46.9	2486	<0.001
Doctor	53.9	1148	
Total	47.4	3973	
Number of ANC visits			
No ANC/Missing/DK ⁶	29.8	371	
1	32.4	171	
2-3	40.6	1559	<0.001
4+	57.9	1872	
Total	47.4	3973	
Skill of delivery provider			
Unskilled ⁷	27.9	2067	
Skilled	68.5	1906	<0.001
Total	47.4	3973	

Continued...

Table 2: —Continued

	Percent	N	χ^2 test P-value
Place of delivery			
Home	27.7	2064	
En route/Other	42.6	52	
Private health facility	76.4	471	<0.001
Public health facilities	67.0	1386	
Total	47.4	3973	

Note: Figures in parenthesis are based on small samples and should be interpreted with caution.

¹ Excludes seven mothers who reported twin births; second twin of first birth is missing.

² Includes one mother who did not respond to the question.

³ Includes seven mothers who reported twin births; second twin of first birth is included.

⁴ Includes eight mothers who did not know whether they were told about complications during ANC and 4 mothers who did not respond to the question.

⁵ Includes three mothers who did not respond to the question.

⁶ Includes 76 who did not know whether they attended ANC and 6 missing cases.

⁷ Includes mothers who were delivered by traditional birth attendants, community health workers and others.

Table 3 shows results of the multivariate logistic regression analysis. The predictors for PNC use were identified using two separate models. Model 1 excluded birth interval, skill of ANC provider, and skill of delivery provider, while Model 2 excluded number of children ever born, number of ANC visits, and place of delivery.

The results of Model 1 show that the odds of PNC use were 42 percent higher among mothers living in urban areas compared with women living in rural areas, while women with no education had 30 percent lower odds of PNC use compared with women with secondary and/or more education, after controlling for other covariates in the model ($p < 0.05$). Women living in all other regions of the country except Rift Valley had lower odds of PNC use (41 percent to 82 percent) compared with women in Nairobi ($p < 0.05$), net of other covariates. Mothers who reported attending four or more ANC visits had 1.84 times higher odds of using PNC services compared with mothers who did not attend ANC, net of other covariates in the model. In general, delivering in a health facility significantly increased use of PNC services after controlling for other covariates in the model ($p < 0.05$).

In Model 2, mothers age 30-39 at birth of last child, women living in urban areas, and women receiving ANC services from either a skilled or unskilled health provider had higher odds of PNC use, after controlling for other covariates ($p < 0.05$). However, having no education, residing outside of Nairobi or Rift Valley regions, and being attended by an unskilled provider during delivery significantly lowered the odds of using PNC services ($p < 0.05$).

Table 3: Multivariate logistic regression analysis for PNC use among women age 15-49 with at least one birth in the five years preceding the survey, Kenya 2008-09

	Model 1				Model 2			
	Adj. Odds ratio	95 percent C.I.		p-value	Adj. Odds ratio	95 percent C.I.		p-value
		Lower limit	Upper limit			Lower limit	Upper limit	
Age of mother at birth of last child								
Below 20	1.07	0.68	1.69	0.761	1.19	0.77	1.84	0.434
20-29	1.21	0.82	1.77	0.338	1.33	0.92	1.93	0.132
30-39	1.39	0.96	2.03	0.085	1.54	1.06	2.25	0.025
40 and Above	Reference				Reference			
Marital status								
Never married	1.14	0.87	1.50	0.351	1.09	0.83	1.43	0.547
Widowed/Separated/Divorced	0.85	0.66	1.10	0.218	0.84	0.65	1.07	0.159
Married/Living together	Reference				Reference			
Residence								
Urban	1.42	1.09	1.85	0.010	1.36	1.05	1.77	.022
Rural	Reference				Reference			
Region								
Northeastern	0.18	0.09	0.38	<0.001	0.12	0.06	0.25	<0.001
Western	0.59	0.37	0.92	0.020	0.53	0.34	0.82	0.005
Rift Valley	0.85	0.56	1.28	0.434	0.75	0.50	1.13	0.171
Nyanza	0.32	0.21	0.49	0.000	0.28	0.19	0.43	<0.001
Eastern	0.59	0.38	0.90	0.016	0.54	0.35	0.82	0.005
Coast	0.49	0.31	0.77	0.002	0.44	0.28	0.69	0.000
Central	0.52	0.33	0.81	0.004	0.46	0.30	0.72	0.001
Nairobi	Reference				Reference			
Level of education								
No education	0.70	0.50	0.97	0.030	0.66	0.48	0.92	0.014
Primary	0.89	0.74	1.07	0.219	0.86	0.72	1.02	0.088
Secondary +	Reference				Reference			
Wealth index								
Poorest	1.13	0.83	1.55	0.430	1.06	0.78	1.44	0.716
Poorer	0.91	0.67	1.22	0.514	0.83	0.62	1.12	0.224
Middle	1.04	0.77	1.39	0.808	0.97	0.72	1.29	0.817
Richer	0.99	0.76	1.29	0.926	0.95	0.73	1.23	0.706
Richest	Reference				Reference			
Religion								
Roman Catholic	0.79	0.51	1.22	0.283	0.77	0.50	1.19	0.244
Protestant	0.72	0.47	1.08	0.115	0.68	0.45	1.03	0.066
Muslim	1.33	0.81	2.18	0.263	1.22	0.74	2.00	0.439
Other (not specified)	Reference				Reference			
Number of children ever born								
4+	1.01	0.76	1.34	0.939	Excluded from Model 2			
3	0.97	0.74	1.28	0.847				
2	1.03	0.81	1.30	0.830				
1	Reference							

Continued...

Table 3: —Continued

	Model 1				Model 2			
	Adj. Odds ratio	95 percent C.I.		p-value	Adj. Odds ratio	95 percent C.I.		p-value
		Lower limit	Upper limit			Lower limit	Upper limit	
Birth interval of preceding child								
Above 59 months	Excluded from Model 1				1.16	0.88	1.54	.292
24-59 months					1.01	0.80	1.27	.957
Below 24 months					0.84	0.64	1.11	.221
No prior birth					Reference			
Whether child was wanted								
Wanted then	1.04	0.85	1.27	0.709	1.05	0.86	1.27	0.653
Wanted later	1.05	0.85	1.30	0.668	1.07	0.86	1.33	0.541
Not wanted at all	Reference				Reference			
Number of ANC visits								
4+	1.84	1.40	2.42	<0.001	Excluded from Model 2			
2-3	1.28	0.97	1.70	0.077				
1	1.12	0.73	1.72	0.602				
No ANC/Missing/DK	Reference							
Skill of ANC provider								
Doctor	Excluded from Model 1				1.56	1.12	2.16	0.008
Nurse/midwife					1.54	1.13	2.10	0.007
Unskilled					3.45	1.73	6.86	<0.001
No ANC/Missing					Reference			
Place of delivery								
Public health facility	4.78	4.02	5.70	<0.001	Excluded from Model 2			
Private health facility	6.60	5.06	8.60	<0.001				
En route/Other	1.99	1.11	3.57	0.022				
Home	Reference							
Skill of delivery provider								
Unskilled	Excluded from Model 1				0.19	0.16	0.23	<0.001
Skilled					Reference			

Birth interval, number of children ever born, whether the last child was wanted, wealth index, marital status, and religion were not found to be predictors of PNC use in both models ($p > 0.05$), after controlling for other factors, while mother's age was a predictor only in Model 2, net of other factors (Table 3).

DISCUSSION

This study, based on a large sample size of the nationally representative DHS survey of women of reproductive age in Kenya, found that use of PNC services, at 47 percent, is low compared with other countries in Africa and Asia (Wang et al., 2011). In the 2008-09 KDHS, 59 percent of health facilities reported the ability to adequately and effectively offer high-quality PNC services (KSPA 2010) compared with 35 percent in 2004 (KSPA 2004). Nonetheless, the use of these services has remained low. Low rates of use result in a breached continuum of care for mothers and their children, which may have undesirable negative outcomes for both the women and their children, including high rates of maternal and neonatal mortality.

We identified several sociodemographic, maternal, and health care delivery factors that could explain PNC use among mothers in Kenya. Our findings suggest that women with education beyond primary school, women living in urban areas, women attending at least four ANC visits, and women delivering in health facilities are more likely to use PNC services compared with other women. This finding is consistent with findings from other developing countries, especially in Africa and Asia (Dhakal et al., 2007; Forte et al., 2006; KNBS and ICF Macro, 2010; Wang et al., 2011; Yoder et al., 2010). Although our analysis did not identify the number of children ever born and wealth index as determinants of PNC use, other studies have reported these two factors as determinants (Forte et al., 2006; KNBS and ICF Macro, 2010).

An interesting and unexpected finding in this study is that women who received ANC services from unskilled providers had nearly four times the odds of using PNC services compared with women who did not attend ANC at all. Their odds were also higher than those who were attended to by skilled providers. Indeed the 2008-2009 KDHS data show that a higher proportion of women who received ANC services from unskilled service providers delivered at their homes. The data further indicate that a majority of those who delivered at home reported being checked for maternal outcomes by someone after delivery. The consistency of these findings may suggest that women who receive ANC services from unskilled health service providers are more likely to deliver at home and report a health check after delivery. This implies that unskilled health service providers are better able to retain their clients throughout the continuum of health care compared with conventional health service providers, perhaps due to proximity, familiarity, cultural considerations, and/or cost. However, these findings require interpretation with caution due to the small size of the sub-sample (49 unweighted cases), and therefore these findings are only suggestive. A more substantive analysis that uses a larger sample may yield more definitive information.

Another interesting finding is that women who delivered with the assistance of unskilled providers were 81 percent less likely to use PNC services compared with women who received skilled delivery assistance. This could possibly be explained by distance, cost, mode of transport, and the notion that after delivery there may be no need for a medical check-up, since the woman is now considered to be “out of danger.” Perhaps only women who developed observable complications would seek these services. However, the issues related to distance from health facility, cost, and quality of service are beyond the scope of the present study.

While the findings were interesting and sometimes surprising, the fact that the DHS data are cross-sectional is an inherent limitation in this study, as causal relationships cannot be established. In addition, although the sample size was large enough to enable the identification of the determinants of PNC use, sub-analysis to assess the relationships among the many covariates was not possible due to the small size of some of the sub-groups. For instance, we would have liked to investigate further the quality of ANC and PNC services provided in the continuum of pregnancy to delivery, but the nature of DHS data do not permit this type of analysis.

It is the recommendation of the authors that programs targeting the strengthening of MNCH services should place special emphasis on encouraging and supporting 24-hour, level-two hospital deliveries; strengthening effective maternal health services throughout the continuum of care; and promoting the use of high-quality services by pregnant women in the hands of skilled providers in approved health facilities. It is also recommended that the government find mechanisms for establishing services for pregnant women to wait in the hospital before the actual delivery. Promoting, and facilitating hospital delivery waiting services days before actual delivery may minimize the risk of home deliveries due to emergency labour onset that requires transport to a health facility, sometimes at odd hours of the day in remote areas of Kenya.

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