

# Determinants of Unintended Pregnancies Among Currently Married Women in Uganda

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## Research article

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## **Determinants of unintended pregnancies among currently married women in Uganda**

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## **Abstract**

**Background:** Unintended pregnancies are no longer bound to teenagers or school going children, married women in Uganda as well experience such pregnancies though little has been investigated on them. This study therefore examines the determinants of unintended pregnancies among currently married women in Uganda.

**Methods:** In this study, we used data from the 2016 Uganda Demographic and Health Survey (UDHS) which comprised of 11,223 married women aged 15-49 years. Analysis was done using descriptive analysis, logistic regression, Poisson regression, log-rank test for survival functions, cox proportional hazards model, and the generalized structural equation model.

**Results:** The study revealed that 45% of the pregnancies were unintended while 3 in 10 married women were not using contraceptives. At the bivariate level; unintended pregnancy was associated with the highest wealth quintile (OR=0.45, 95%CI=0.40-0.49) while contraceptive use was associated with higher education level (OR=4.90, 95% CI=4.10-5.86). Similarly, children ever born were associated with married women from rural areas (IRR=4.34, 95% CI=4.30-4.39). At the multivariate level, married women from northern region (AOR=0.55, 95% CI=0.45-0.64) had lower odds and Muslim married women with more children (AOR=1.04, 95% CI=1.01-1.07) had higher odds of unintended pregnancy.

**Conclusion:** Unintended pregnancies are directly and indirectly influenced by higher fertility and improver use of contraceptive. Married women who had more children and were: from poor households, with lowest education, in Central region, in rural areas, with low age at first birth, with older partners and were Muslim were more likely to have unintended pregnancies. Also, married women who were using contraceptives and were: older age, Anglican, from wealthiest households, in agricultural or domestic sector and higher parity were associated with higher risk of unintended pregnancies. The government should make efforts in reducing the fertility among married women by investing in programs and policies like: sensitization of women on the effectiveness in use of contraceptives, making contraceptives affordable and easily accessible to all people in different regions of the country with emphasis on who already have four or more children. Extension of higher education to all people will lead to reduced risks of unintended pregnancies.

**Keywords:** Unintended pregnancies, married women, Uganda

## **Background**

Unintended pregnancies are pregnancies that are either unwanted or mistimed at the time of conception [1]. Globally, an estimate of 9,817 women become pregnant every day without planning [2]. These pregnancies have brought a public health concern in both developed and developing countries because of their association with adverse social, health and economic outcomes for both mothers and their children resulting to 529,000 deaths[3, 4]. Not only in Africa, studies in USA, China, Netherlands, and France have also registered increasing trends in unplanned births [1, 5-7]. However, 8 in 100 women experience unplanned pregnancies in Africa, the highest rate globally with eastern Africa taking the lead [7].

In Uganda, the situation is also alarming with an estimate of 1.2 million unintended pregnancies being registered in 2008 representing more than half of the country's 2.2 million pregnancies [8]. Since then, the prevalence has seemingly remained high with 52% of such pregnancies registered in 2013 [9] leading to many deaths and abortions [10]. Other than mortality and abortion, studies also show that women who experience unintended pregnancies are more likely to have health problems like hypertension, hypothyroidism, diabetes, hepatitis, and cardiac disorders [12-14]; have low psychosocial well-being and high maternal depression [15-18]. In Nepal, Puri revealed that women with such pregnancies still spend a lot of money to take care of their pregnancies [15]. However, it should be noted that this expenditure is not only inclined on these women but to the whole nation as well. Sonfield and colleagues revealed that half of the public expenditure in USA caters for unintended pregnancies which negatively affects the growth of the nation and the population as whole [19, 20]. Other consequences include inadequate: prenatal care, antenatal care, breast feeding and parenting [21, 22].

According to 2016 UDHS, the total wanted fertility rate among Ugandan women is five children as compared to the actual total fertility rate of six children; implying that women in Uganda are having one child more than they want [20]. Similarly, the contraceptive prevalence rate among married women of reproductive age in Uganda is still very low with 3 in 10 wishing to delay or avoid pregnancy but are not using any contraceptive measure and yet desire a small family size [20]. Therefore, the combination of low contraceptive use and smaller desired family size among married women implies high levels of unmet need for family planning which ranks Uganda highly in the Sub-Saharan Africa [9, 23-24]. However, relatively very little research on unintended

pregnancy among married women has been documented in Uganda. However, other existing studies have been done elsewhere like: China, USA, Ethiopia, Bangladeshi, Nigeria, Kenya and Malawi [5, 25-29, 3]. Several studies have also associated socio-demographic, economic, and intermediate factors on unintended pregnancy [3, 29-31]. However, most of these studies were limited in providing an understanding of the inter-relationships among the factors associated with such pregnancies since researchers used binary regression models. This study therefore was intended to address the shortfalls in regard to scope and methodology in assessing the determinants of unintended pregnancy among currently married women in Uganda by answering the following objectives: Identify the demographic; socio-economic, and intermediate factors associated to unintended pregnancy.

### **Data and methods**

Data for this study was based on secondary data from the 2016 Uganda Demographic and Health Survey (UDHS). The authorization to use the data was obtained from Measure DHS by providing a description of the study through their website. The 2016 UDHS was a national representative survey that employed a two stage stratified sample design. In the first stage, 696 enumeration areas were selected from a list of clusters based on the 2014 Uganda Population and Housing Census sample frame. The second stage involved a systematic sampling of 20,880 households within each cluster from which all women of child bearing age (15-49 years), who were either permanent residents of the households or visitors who slept in the households the night before the survey were eligible to be interviewed. A total of 18,506 women aged 15-49 years were interviewed. In this study, women who were never married as well as those who were divorced, separated, widowed were excluded. A weighted total of 11,223 women aged 15-49 years who were either married or living together with a partner as though married at the time of the survey consisted our study sample.

### **Variables and their measurements**

In this study, unintended pregnancy was the dependent variable. In the 2016 UDHS, unintended pregnancy,  $Y_1$ , was measured by the question, “At the time you became pregnant, did you want to become pregnant then, did you want to wait until later, or did you not want to have any (more) children at all?” [20]. Women were asked this question for all the last five children produced before the time of the survey. Based on this definition, we generated unintended pregnancy as a binary

outcome coded 1 if any of the pregnancies was unintended (if any of the pregnancies occurred at a time when the woman would have wanted it later or did not want it at all) and 0 otherwise (if all the pregnancies occurred at a time when the woman wanted them) as illustrated in the equation below.

$$Y_1 = \begin{cases} 1 & \text{If a woman had unintended pregnancy} \\ 0 & \text{otherwise} \end{cases} \quad (1)$$

Predictor variables considered included: woman's age,  $X_1$  (15-24, 25-34, and 35-49), place of residence,  $X_2$  (urban, rural), education level attainment,  $X_3$  (no education, primary, secondary and higher), religion,  $X_4$  (Catholic, Protestant, Muslims, Others; where other religions include Seventh Day Adventists (SDA), Orthodox, Born again/Pentecostal/Evangelical, Baha'i, Baptist, Presbyterian, Jehovah's witness, Salvation army, Traditionalists and other unknown religions), wealth index,  $X_5$  (poor, middle, rich and richest), region,  $X_6$  (Central, Eastern, Northern and Western), Occupation,  $X_7$  (not working, professional & clerical, agricultural & domestic, sales & services, and manual), partner's level of education,  $X_8$  (no education, primary, secondary and higher), partner's age,  $X_9$  (15-24, 25-34 and 35-49), literacy,  $X_{10}$  (cannot read at all, able to read, and others included blind/visually impaired or no available card with required language), media,  $X_{11}$  (no access and has access). Additional variables included: age at first marriage,  $Y_2$  (continuous), age at first sex,  $Y_3$  (continuous), age at first birth,  $Y_4$  (continuous), total children ever born,  $Y_5$  (count), and use of contraceptives,  $Y_6$  (yes and no). In order to have the inter-relationship among these variables, we grouped them into two categories that is; exogenous and endogenous variables. The selected exogenous variables were: women's age, place of residence, region of residence, wealth index, education status, partner's education level, partner's age, occupation, religion, literacy, media access, age at first marriage, age at first sex, age at first birth, children ever born, and contraceptive use. On the other hand, there were six endogenous variables such as: age at first marriage, age at first sex, age at first birth, children ever born, contraceptive use, and unintended pregnancy.

### **Data Analysis**

Data analysis was done using STATA 15 at three stages. The data were first weighted to ensure representativeness of the sampled data. A weighting variable generated using the sample weight variable in the DHS data was applied in all statistical commands. At the first stage of analysis, a

descriptive summary (either as percentages for the categorical variables or mean for the continuous variables) of socio-demographic, economic, and intermediate factors was done. At the second stage, the determinants of unintended pregnancy and contraceptive use were assessed by the socio-demographic, economic, and intermediate factors using logistic regression model, whereas a Poisson regression model was applied to assess the factors that influence the children ever born. The log rank test of equality of survival functions at  $p < 0.05$  was also applied to test for significant differences in Age at first marriage, Age at first sex, and Age at first birth for married women of different socio-demographic and economic characteristics. The results at this stage indicated how the exogenous variables independently influenced the endogenous variables. The purpose of this level was to select variables for further analysis at the multivariate level. The models at this stage were based on the following equations:

$$\ln \left( \frac{P(Y_1=1)}{1-P(Y_1=1)} \right) = \beta_0 + \sum \beta_{1j} X_j \quad (2)$$

$$Y_2 = \beta_1 + \sum \beta_{2j} X_j + \varepsilon_1 \quad (3)$$

$$Y_3 = \beta_2 + \sum \beta_{3j} X_j + \varepsilon_2 \quad (4)$$

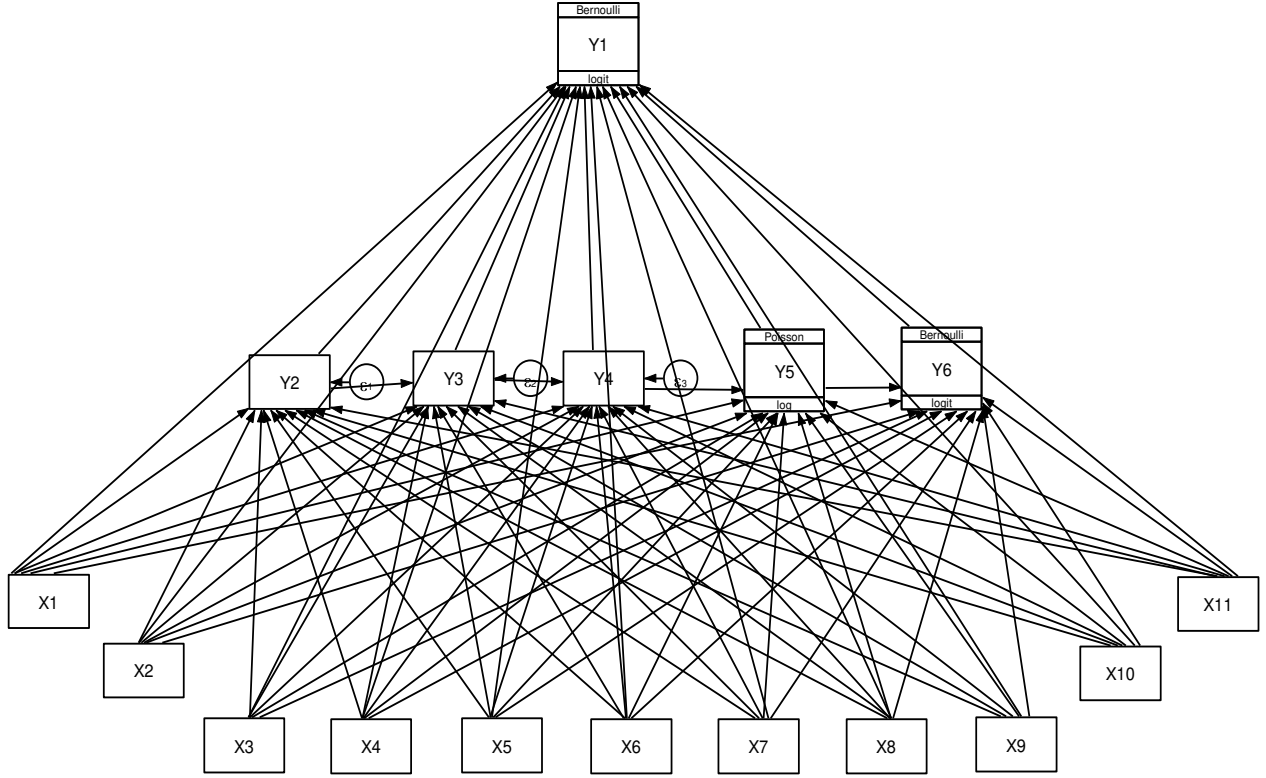
$$Y_4 = \beta_3 + \sum \beta_{4j} X_j + \varepsilon_3 \quad (5)$$

$$Y_5 = e^{\beta_4 + \sum \beta_{5j} X_j} \quad (6)$$

$$\ln \left( \frac{P(Y_6=1)}{1-P(Y_6=1)} \right) = \beta_5 + \sum \beta_{6j} X_j \quad (7)$$

Where  $P(Y_j)$  with  $j = 1, 6$  is the probability that one had unintended pregnancy or ever used contraceptives respectively;  $\beta_0, \dots, \beta_5$  are the intercepts;  $\beta_{1j}, \dots, \beta_{6j}$  are regression coefficients;  $X_j$  are explanatory variables;  $Y_5$  is the expected number of children per woman;  $e$  is the base of natural logarithms;  $Y_2, Y_3, Y_4$  is the woman's Age at first marriage, Age at first sex, and Age at first birth respectively with  $\varepsilon_i$  being the error terms.

At the third stage, the net-impact of the exogenous variables on the endogenous variables were established using a Generalized Structural Equation Model (GSEM). Several multiple relationships of endogenous and exogenous variables were investigated using path analysis as shown in Figure 1 below. The relationships comprise of direct and indirect effects on the endogenous factors.



**Figure 1: The gsem model showing the selected exogenous and endogenous**

The model was based on the following equations:

$$\ln\left(\frac{P(Y_1=1)}{1-P(Y_1=1)}\right) = \beta_0 + \sum_{j=2}^6 \beta_{1j}Y_j + \sum_{j=1}^{11} \beta_{1j}X_j \quad (8)$$

$$Y_2 = \beta_1 + \sum_{j=1}^{11} \beta_{2j}X_j + \varepsilon_1 \quad (9)$$

$$Y_3 = \beta_2 + \beta_{32}Y_2 + \sum_{j=1}^{11} \beta_{3j}X_j + \varepsilon_2 \quad (10)$$

$$Y_4 = \beta_3 + \sum_{j=2}^3 \beta_{4j}Y_j + \sum_{j=1}^{11} \beta_{4j}X_j + \varepsilon_3 \quad (11)$$

$$Y_5 = e^{\beta_4 + \sum_{j=2}^4 \beta_{5j}Y_j + \sum_{j=1}^{11} \beta_{5j}X_j} \quad (12)$$

$$\ln\left(\frac{P(Y_6=1)}{1-P(Y_6=1)}\right) = \beta_5 + \sum_{j=2}^5 \beta_{6j}Y_j + \sum_{j=1}^{11} \beta_{6j}X_j \quad (13)$$

Where:  $\beta_{ij}$  are the path coefficients representing the direct effect of variable  $j$  on variable  $i$ ;  $\beta_0 \dots \beta_5$  are the intercepts;  $X_j$  are exogenous variables;  $Y_1, \dots, Y_6$  are the endogenous variables with  $\varepsilon_i$  being the error terms.



A diagnostic test was performed after GSEM by running two models in order to check the level of adequacy of the explanatory variables in predicting the outcome variable by using the Akaike Information Criterion. The first model was the regression with all the variables while the other was a regression with only variables that had significant association at the bivariate level.

## **Results**

Table 1 presents the selected demographic, socio-economic and intermediate characteristics of currently married women aged 15–49 years. The results indicate that majority of married women were Catholics (40%) of which three quarters were from urban areas. Of these, a great number were also from eastern region of Uganda. The results also show that the majority of married women were employed in sales and service work (46%) while the highest number had also attained primary education (59%) despite 1 in 5 being uneducated. Many of the married women were also lying under the lowest wealth quintile with almost 4 in 10 being poor. The results further reveal that majority of the women were able to read and could at least access information (newspaper, radio or television). Still, the average age at first marriage, age at first sex, and age at first birth among married women were respectively 18, 17, and 19 years giving birth on average four children. Additionally, more than half of the married women had their husbands having attained at least a primary level of education. Still, more than half of the married women were using contraceptives while 3 in 10 were not using them leading to 4 in 10 births being unintended.

**Table 1: Distribution of married women by the selected variables**

<b>Variable</b>	<b>Frequency (n=11,223)</b>	<b>Percentage (%)</b>
<b>Age</b>		
15-24	3,294	29.4
25-34	4,355	38.8
35-49	3,574	31.8
<b>Religion</b>		
Catholic	4,471	39.9
Anglican	3,505	31.2
Muslim	1,483	13.2
Others	1,764	15.7
<b>Place of residence</b>		
Rural	8,579	23.6
Urban	2,644	76.4
<b>Occupation</b>		
Not working	1,819	16.2
Professional & clerical	996	8.9
Agricultural & domestic	1,558	13.9
Sales & services	5,155	46.0
Manual	1,688	15.1
<b>Education level</b>		
No education	1,345	12.0
Primary	6,667	59.4
Secondary	2,353	21.0
Higher	857	7.6
<b>Partner's education</b>		
No education	712	6.4
Primary	5,831	52.0
Secondary	3,012	26.8
Higher	1,358	12.1
<b>Partner's age</b>		
≤ 24 <sup>†</sup>	1,198	10.7
25-34	3,988	35.5
35-44	3,380	30.1
45 and above	2,657	23.7
<b>Region</b>		
Central	3,005	26.8
Eastern	3,105	27.7
Western	2,902	25.9
Northern	2,212	19.7
<b>Wealth index</b>		
Poor	4,370	38.9
Middle	2,192	19.6
Rich	2,185	19.4
Richest	2,476	22.1
<b>Literacy level</b>		

Cannot read at all	4,182	37.3
Able to read	6,960	62.0
Others	81	0.7
<b>Media access</b>		
Has access	7,341	65.4
Has no access	3,882	34.6
<b>Contraceptive use</b>		
Yes	7,812	69.6
No	3,411	30.4
<b>Unintended Pregnancy</b>		
Yes	3,894	44.6
No	4,835	55.4
<b>Age at first marriage</b> (continuous)	11,223	18.4
<b>Age at first sex</b> (continuous)	11,214	16.6
<b>Age at first birth</b> (continuous)	10,526	18.7
<b>Children ever born</b> (count)	11,223	4.1

## Bivariate analysis

**Table 2: Association between Unintended pregnancy and the selected factors**

Variable	OR	Std. Err	95% CI		p-value
<b>Region</b>					
<b>Woman's age</b>					
15-24 <sup>†</sup>	1.000	-	-	-	-
25-34	0.713	0.023	0.668	0.760	<b>0.000</b>
35-49	1.116	0.051	1.020	1.221	<b>0.017</b>
<b>Region</b>					
Central <sup>†</sup>	1.000	-	-	-	-
Eastern	1.116	0.045	1.031	1.208	<b>0.006</b>
Western	0.536	0.024	0.491	0.585	<b>0.000</b>
Northern	1.086	0.052	0.990	1.192	0.081
<b>Place of residence</b>					
Urban <sup>†</sup>	1.000	-	-	-	-
Rural	0.906	0.022	0.864	0.950	<b>0.000</b>
<b>Religion</b>					
Catholic <sup>†</sup>	1.000	-	-	-	-
Anglican	0.799	0.031	0.741	0.862	<b>0.000</b>
Muslim	0.885	0.051	0.791	0.990	<b>0.033</b>
Others	0.809	0.043	0.729	0.899	<b>0.000</b>
<b>Wealth index</b>					
Poor <sup>†</sup>	1.000	-	-	-	-
Middle	0.999	0.049	0.908	1.099	0.988
Rich	0.737	0.038	0.667	0.815	<b>0.000</b>
Richest	0.446	0.023	0.404	0.493	<b>0.000</b>
<b>Occupation</b>					

Not working <sup>†</sup>	1.000	-	-	-	-
Professional & clerical	0.521	0.041	0.447	0.607	<b>0.000</b>
Agricultural & domestic	0.705	0.042	0.628	0.792	<b>0.000</b>
Sales & services	0.984	0.031	0.925	1.047	0.603
Manual	0.792	0.045	0.709	0.884	<b>0.000</b>
<b>Woman's education</b>					
No education <sup>†</sup>	1.000	-	-	-	-
Primary	0.968	0.027	0.917	1.022	0.241
Secondary	0.633	0.030	0.577	0.694	<b>0.000</b>
Higher	0.362	0.032	0.304	0.430	<b>0.000</b>
<b>Partner's education</b>					
No education <sup>†</sup>	1.000	-	-	-	-
Primary	0.941	0.028	0.888	0.997	<b>0.040</b>
Secondary	0.762	0.032	0.703	0.826	<b>0.000</b>
Higher	0.566	0.037	0.498	0.642	<b>0.000</b>
<b>Partner's age</b>					
≤ 24 <sup>†</sup>	1.000	-	-	-	-
25-34	0.709	0.024	0.664	0.757	<b>0.000</b>
35-44	0.821	0.032	0.761	0.886	<b>0.000</b>
45 and above	1.074	0.058	0.966	1.194	0.187
<b>Literacy</b>					
Cannot read at all <sup>†</sup>	1.000	-	-	-	-
Able to read	0.705	0.019	0.668	0.744	<b>0.000</b>
Others	0.902	0.258	0.515	1.580	0.719
<b>Media access</b>					
Has no access <sup>†</sup>	1.000	-	-	-	-
Has access	0.765	0.021	0.725	0.806	<b>0.000</b>
<b>Contraceptives use</b>					
No	1.000	-	-	-	-
Yes	0.822	0.021	0.782	0.864	<b>0.000</b>
<b>Age at first marriage</b>	0.986	0.001	0.984	0.989	<b>0.000</b>
<b>Age at first sex</b>	0.985	0.001	0.983	0.988	<b>0.000</b>
<b>Age at first birth</b>	0.988	0.001	0.986	0.990	<b>0.000</b>
<b>Children ever born</b>	1.010	0.005	1.001	1.019	<b>0.034</b>

<sup>†</sup> is a Reference category, OR is the Odds Ratio, 95% CI is the Confidence Interval, the assessment was based on logistic regression model at  $p < 0.05$  with  $n = 8,906$  and  $\chi^2=0.000$

Results in Table 2 indicate that the following factors had increased odds of having unintended pregnancy: older married women aged 35-49 compared to those less than 25 years; women from eastern region compared to their counter parts in central, and those with more children. Similarly, odds ratio on unintended pregnancy reduced as: the economic status improved; women aged 25-14 against those less than 25 years; women from western region compared to their counter parts in central; women in rural areas against those in urban; Anglican and Muslim women compared to

Catholics; more educated women (secondary and higher level) compared to those with no education; those whose partners were educated; women whose partners were aged above 24 years; women who could read and write compared to illiterates; employed married women (professional & clerical sectors, agricultural & domestic sectors, and manual) against those without employment; women who could access media and those who were using contraceptives; women with higher age at first marriage or age at first sex or age at first birth. All these factors were treated as direct factors that influence unintended pregnancy and were considered for further analysis in the multivariate model.

**Table 3: Association of Age at first marriage, Age at first sex, and Age at first birth for the selected categorical variables**

Categorical variables	df	Age at first marriage		Age at first sex		Age at first birth	
		Log rank	p-value	Log rank	p-value	Log rank	p-value
Woman's age	2	473.24	<b>0.000</b>	84.14	<b>0.000</b>	457.44	<b>0.000</b>
Region	3	157.11	<b>0.000</b>	313.90	<b>0.000</b>	203.99	<b>0.000</b>
Place of residence	1	257.48	<b>0.000</b>	224.73	<b>0.000</b>	248.37	<b>0.000</b>
Religion	3	7.86	<b>0.049</b>	58.62	<b>0.000</b>	18.15	<b>0.000</b>
Wealth index	3	493.37	<b>0.000</b>	490.21	<b>0.000</b>	473.86	<b>0.000</b>
Occupation	4	474.32	<b>0.000</b>	483.43	<b>0.000</b>	488.98	<b>0.000</b>
Woman's education	3	857.79	<b>0.000</b>	1184.74	<b>0.000</b>	1093.63	<b>0.000</b>
Partner's education	4	486.35	<b>0.000</b>	689.40	<b>0.000</b>	703.56	<b>0.000</b>
Partner's age	3	197.69	<b>0.000</b>	58.50	<b>0.000</b>	149.91	<b>0.000</b>
Literacy	2	265.21	<b>0.000</b>	650.68	<b>0.000</b>	294.82	<b>0.000</b>
Media access	1	92.05	<b>0.000</b>	115.30	<b>0.000</b>	89.80	<b>0.000</b>

*The assessment was based on log-rank test of equality for survival function at  $p < 0.05$ ; df represents the degrees of freedom.*

**Table 4: Association of Age at first sex, and Age at first birth for continuous variables**

Continuous variable	Age at first sex			Age at first birth		
	HR	Std. Err	p-value	HR	Std. Err	p-value
Age at first marriage	0.858	0.003	0.000	0.820	0.003	0.000
Age at first sex	-	-	-	0.822	0.003	0.000

*The assessment was based on Cox proportional hazards model at  $p < 0.05$  and  $\chi^2 = 0.000$ ; HR is the Hazard ratio; Std. Err is the standard error in HR; (-) shows a variable not considered for a particular outcome.*

Results in Table 3 and 4 indicate that woman's age, region, place of residence, wealth index, occupation, education level of the woman and her partner, partner's age, literacy and access to media significantly influence age at first marriage, age at first sex and age at first birth. Still, age at first marriage influences age at first marriage while age at first sex impacts age at first birth.

**Table 5: Association between Children ever born and the selected factors**

Variable	IRR	Std. Err	95% CI		p-value
<b>Woman's age</b>					
15-24 <sup>†</sup>	1.000	-	-	-	-
25-34	3.805	0.030	3.747	3.863	<b>0.000</b>
35-49	6.731	0.043	6.646	6.816	<b>0.000</b>
<b>Region</b>					
Central <sup>†</sup>	1.000	-	-	-	-
Eastern	4.451	0.038	4.378	4.526	<b>0.000</b>
Western	4.050	0.037	3.977	4.123	<b>0.000</b>
Northern	4.159	0.043	4.075	4.244	<b>0.000</b>
<b>Place of residence</b>					
Urban <sup>†</sup>	1.000	-	-	-	-
Rural	4.342	0.022	4.298	4.386	<b>0.000</b>
<b>Religion</b>					
Catholic <sup>†</sup>	1.000	-	-	-	-
Anglican	4.192	0.035	4.125	4.260	<b>0.000</b>
Muslim	3.897	0.051	3.798	3.999	<b>0.000</b>
Others	4.139	0.048	4.045	4.235	<b>0.000</b>
<b>Wealth index</b>					
Poor <sup>†</sup>	1.000	-	-	-	-
Middle	4.577	0.046	4.488	4.667	<b>0.000</b>
Rich	4.236	0.044	4.151	4.323	<b>0.000</b>
Richest	3.057	0.035	2.989	3.127	<b>0.000</b>
<b>Occupation</b>					
Not working <sup>†</sup>	1.000	-	-	-	-
Professional & clerical	3.083	0.056	2.975	3.194	<b>0.000</b>
Agricultural & domestic	3.419	0.047	3.328	3.512	<b>0.000</b>

Sales & services	4.638	0.030	4.579	4.697	<b>0.000</b>
Manual	4.107	0.049	4.012	4.205	<b>0.000</b>
<b>Woman's education</b>					
No education <sup>†</sup>	1.000	-	-	-	-
Primary	4.319	0.025	4.012	4.205	<b>0.000</b>
Secondary	2.793	0.034	2.727	2.862	<b>0.000</b>
Higher	2.366	0.053	2.265	2.471	<b>0.000</b>
<b>Partner's education</b>					
No education <sup>†</sup>	1.000	-	-	-	-
Primary	4.527	0.028	4.473	4.582	<b>0.000</b>
Secondary	3.413	0.034	3.348	3.480	<b>0.000</b>
Higher	3.041	0.047	2.950	3.135	<b>0.000</b>
<b>Partner's age</b>					
≤ 24 <sup>†</sup>	1.000	-	-	-	-
25-34	2.687	0.047	2.637	2.739	<b>0.000</b>
35-44	4.839	0.038	4.765	4.913	<b>0.000</b>
45 and above	6.517	0.050	6.420	6.614	<b>0.000</b>
<b>Literacy</b>					
Cannot read at all <sup>†</sup>	1.000	-	-	-	-
Able to read	3.434	0.022	3.391	3.478	<b>0.000</b>
Others	4.588	0.238	4.144	5.079	<b>0.000</b>
<b>Media access</b>					
Has no access <sup>†</sup>	1.000	-	-	-	-
Has access	3.873	0.023	3.828	3.918	<b>0.000</b>
<b>Age at first marriage</b>	1.071	0.000	1.070	1.071	<b>0.000</b>
<b>Age at first sex</b>	1.083	0.000	1.082	1.084	<b>0.000</b>
<b>Age at first birth</b>	1.076	0.000	1.075	1.076	<b>0.000</b>

<sup>†</sup> is a Reference category, IRR are Incidence Risk Ratios, 95% CI is the Confidence Interval at  $p < 0.05$  with  $n = 11,379$  and  $\chi^2 = 0.000$  based on Poisson regression model

From Table 5, we found out that the age of a woman and her husband, place of residence, religion, wealth index, region, education level of both the wife and the partner, occupation, literacy, media, Age at first marriage, Age at first sex, and Age at first birth significantly influence the number of children ever born by a woman ( $p < 0.05$ ). These variables were later considered and modeled at the multivariate level to determine the indirect factors that influence unintended pregnancy through children ever born.

**Table 6: Association between contraceptive use and the selected factors**

<b>Variable</b>	<b>OR</b>	<b>Std. Err</b>	<b>95% CI</b>		<b>p-value</b>
<b>Woman's age</b>					
15-24 <sup>†</sup>	1.000	-	-	-	-
25-34	3.472	0.126	3.233	3.728	<b>0.000</b>
35-49	2.272	0.083	2.116	2.440	<b>0.000</b>
<b>Region</b>					
Central <sup>†</sup>	1.000	-	-	-	-
Eastern	2.294	0.090	2.125	2.476	<b>0.000</b>
Western	2.270	0.091	2.098	2.456	<b>0.000</b>
Northern	1.216	0.052	1.118	1.322	<b>0.000</b>
<b>Place of residence</b>					
Urban <sup>†</sup>	1.000	-	-	-	-
Rural	1.989	0.046	1.902	2.080	<b>0.000</b>
<b>Religion</b>					
Catholic <sup>†</sup>	1.000	-	-	-	-
Anglican	2.776	0.106	2.575	2.992	<b>0.000</b>
Muslim	2.603	0.151	2.323	2.916	<b>0.000</b>
Others	2.207	0.113	1.995	2.441	<b>0.000</b>
<b>Wealth index</b>					
Poor <sup>†</sup>	1.000	-	-	-	-
Middle	2.461	0.116	2.244	2.699	<b>0.000</b>
Rich	3.162	0.158	2.866	3.488	<b>0.000</b>
Richest	5.071	0.275	4.560	5.639	<b>0.000</b>
<b>Occupation</b>					
Not working <sup>†</sup>	1.000	-	-	-	-
Professional & clerical	4.305	0.349	3.673	5.046	<b>0.000</b>
Agricultural & domestic	3.774	0.235	3.341	4.264	<b>0.000</b>
Sales & services	1.940	0.057	1.832	2.055	<b>0.000</b>
Manual	2.270	0.120	2.047	2.518	<b>0.000</b>
<b>Woman's education</b>					
No education <sup>†</sup>	1.000	-	-	-	-
Primary	2.143	0.056	2.035	2.256	<b>0.000</b>
Secondary	3.918	0.201	3.543	4.331	<b>0.000</b>
Higher	4.900	0.446	4.100	5.857	<b>0.000</b>
<b>Partner's education</b>					
No education <sup>†</sup>	1.000	-	-	-	-
Primary	1.938	0.054	1.836	2.046	<b>0.000</b>
Secondary	3.116	0.132	2.867	3.387	<b>0.000</b>
Higher	4.125	0.282	3.607	4.717	<b>0.000</b>
<b>Partner's age</b>					
≤ 24 <sup>†</sup>	1.000	-	-	-	-
25-34	2.587	0.091	2.414	2.773	<b>0.000</b>
35-44	3.171	0.128	2.930	3.432	<b>0.000</b>
45 and above	2.060	0.085	1.899	2.234	<b>0.000</b>
<b>Literacy</b>					



Cannot read at all <sup>†</sup>	1.000	-	-	-	-
Able to read	3.140	0.088	2.972	3.317	<b>0.000</b>
Others	1.584	0.362	1.013	2.478	<b>0.044</b>
<b>Media access</b>					
Has no access <sup>†</sup>	1.000	-	-	-	-
Has access	2.849	0.076	2.705	3.002	<b>0.000</b>
<b>Age at first marriage</b>	1.045	0.001	1.042	1.047	<b>0.000</b>
<b>Age at first sex</b>	1.012	0.001	1.048	1.053	<b>0.000</b>
<b>Age at first birth</b>	1.050	0.010	1.048	1.053	<b>0.000</b>
<b>Children ever born</b>	1.184	0.005	1.173	1.195	<b>0.000</b>

<sup>†</sup> is a Reference category, OR is the Odds Ratio, CI is the Confidence Interval; the assessment was based on logistic regression model at  $p < 0.05$  with  $n = 11,379$  and  $\chi^2 = 0.000$

According to Table 6, we discovered that all the following factors had a positive influence on contraceptive use; age of the woman, region, place of residence, religion, wealth index, occupation, education level of the woman and partner, partner's age, literacy, media, ability to read, children ever born, age at first marriage, age at first sex, and age at first birth. These factors together directly influence Contraceptive use ( $p < 0.05$ ) and were considered for multivariate stage to further identify the indirect impact.

### Multivariate analysis basing on Generalized Structural Equation Model

**Table 7: Direct determinants of Unintended Pregnancies**

Variable	AOR	Std. Err	95% CI		p-value
<b>Woman's age</b>					
15-24 <sup>†</sup>	1.000	-	-	-	-
25-34	0.623	0.045	0.540	0.719	<b>0.000</b>
35-49	0.500	0.061	0.394	0.634	<b>0.000</b>
<b>Region</b>					
Central <sup>†</sup>	1.000	-	-	-	-
Eastern	1.240	0.092	1.072	1.434	<b>0.004</b>
Western	0.722	0.054	0.624	0.837	<b>0.001</b>
Northern	1.302	0.107	1.108	1.530	<b>0.000</b>
<b>Place of residence</b>					
Urban <sup>†</sup>	1.000	-	-	-	-
Rural	1.082	0.078	0.939	1.246	0.276
<b>Religion</b>					
Catholic <sup>†</sup>	1.000	-	-	-	-
Anglican	1.033	0.058	0.926	1.152	0.564
Muslim	1.134	0.087	0.976	1.318	0.101
Others	1.112	0.077	0.971	1.273	0.125
<b>Wealth index</b>					
Poor <sup>†</sup>	1.000	-	-	-	-
Middle	0.993	0.065	0.872	1.130	0.911

Rich	0.855	0.062	0.742	0.985	<b>0.031</b>
Richest	0.618	0.061	0.509	0.751	<b>0.000</b>
<b>Occupation</b>					
Not working <sup>†</sup>	1.000	-	-	-	-
Professional & clerical	1.238	0.143	0.987	1.551	0.065
Agricultural & domestic	1.206	0.105	1.017	1.430	<b>0.031</b>
Sales & services	1.082	0.075	0.945	1.239	0.254
Manual	1.097	0.090	0.934	1.289	0.261
<b>Woman's education</b>					
No education <sup>†</sup>	1.000	-	-	-	-
Primary	1.589	0.132	1.350	1.869	<b>0.000</b>
Secondary	1.586	0.174	1.279	1.966	<b>0.000</b>
Higher	1.096	0.182	0.792	1.518	0.580
<b>Partner's education</b>					
No education <sup>†</sup>	1.000	-	-	-	-
Primary	2.297	0.230	1.887	2.795	<b>0.000</b>
Secondary	2.379	0.259	1.922	2.945	<b>0.000</b>
Higher	2.702	0.358	2.084	3.504	<b>0.000</b>
<b>Partner's age</b>					
≤ 24 <sup>†</sup>	1.000	-	-	-	-
25-34	0.782	0.066	0.663	0.923	<b>0.004</b>
35-44	0.754	0.075	0.620	0.918	<b>0.005</b>
45 and above	0.756	0.089	0.600	0.953	<b>0.018</b>
<b>Literacy</b>					
Cannot read at all <sup>†</sup>	1.000	-	-	-	-
Able to read	0.924	0.054	0.824	1.036	0.176
Others	0.933	0.278	0.521	1.672	0.817
<b>Media access</b>					
Has no access <sup>†</sup>	1.000	-	-	-	-
Has access	1.067	0.054	0.966	1.179	0.202
<b>Age at first marriage</b>	0.994	0.008	0.979	1.010	0.483
<b>Age at first sex</b>	1.008	0.013	0.983	1.033	0.531
<b>Age at first birth</b>	0.995	0.012	0.971	1.019	0.655
<b>Children ever born</b>	1.263	0.022	1.220	1.307	<b>0.000</b>
<b>Contraceptive use</b>					
No <sup>†</sup>	1.000	-	-	-	-
Yes	1.155	1.155	1.039	1.284	<b>0.007</b>

<sup>†</sup> is a Reference category, AOR is the Adjusted Odds Ratio, CI is the Confidence Interval at 95%; the assessment was based on gsem at n=11,371 and  $p < 0.05$

After adjusting and controlling for possible cofounders, results in Table 7 show that women aged 35-49 were 50% (AOR= 0.50, 95%CI= 0.39-0.63) less likely to experience unintended pregnancy compared to those less than 25 years while those from northern region were 30% at a higher risk of getting unintended pregnancy as compared to their counter parts in the central region

(AOR=1.30, 95%CI=1.55-2.07). However, women from western region were 28% less likely to have unintended pregnancy as compared to those in the central (AOR=0.72, 95%CI= 0.62-0.84). Still, married women from the highest wealth quintile were 38% less likely to experience unplanned pregnancies as compared to those in the lowest wealth quintile (AOR=0.62, 95%CI= 0.51-0.75). Additionally, there was almost no difference between married women with primary or secondary level of education towards the risk of having unintended pregnancy with both groups being 59% (AOR=1.59, 95%CI= 1.35-1.87; AOR=1.59; 95%CI=1.28-1.97) more likely to experience unintended pregnancy compared to their counter parts with no education. Similarly, women whose partners had higher educational level were thrice more likely to experience unintended pregnancy compared to those whose partners had no education (AOR=2.70, 95%CI= 2.08-3.50). Also, as the age of the partner increases, the risk of a woman to experience unintended pregnancy reduces with married women whose partners were aged above 44 years being 24% (AOR=0.76, 95%CI= 0.60-0.95) less likely to experience unintended pregnancy as compared to those whose partners were less than 25 years. Married women who were employed in agricultural & domestic work were 21% (AOR=1.21, 95%CI= 1.02-1.43) more likely to experience unintended pregnancy as compared to those who were not working. Married women who had more children were 26% more likely to experience unintended pregnancy compared to those with few children (AOR=1.26, 95%CI=1.22-1.31). Surprisingly married women who were using contraceptives were 16% (AOR=1.16, 95%CI= 1.04-1.28) more likely to have unintended pregnancy as compared to those who were not using contraceptives.

**Table 8: Indirect determinants of Unintended Pregnancies through Children ever born**

<b>Variable</b>	<b>AOR</b>	<b>Std. Err</b>	<b>95% CI</b>		<b>p-value</b>
<b>Woman's age</b>					
15-24 <sup>†</sup>	1.000	-	-	-	-
25-34	1.869	0.034	1.803	1.937	<b>0.000</b>
35-49	2.791	0.058	2.678	2.908	<b>0.000</b>
<b>Region</b>					
Central <sup>†</sup>	1.000	-	-	-	-
Eastern	1.029	0.016	0.999	1.060	0.057
Western	0.977	0.015	0.948	1.006	0.118
Northern	0.967	0.016	0.935	0.999	<b>0.044</b>
<b>Place of residence</b>					
Urban <sup>†</sup>	1.000	-	-	-	-
Rural	1.054	0.016	1.024	1.085	<b>0.000</b>
<b>Religion</b>					
Catholic <sup>†</sup>	1.000	-	-	-	-

Anglican	1.017	0.011	0.994	1.039	0.143
Muslim	1.040	0.017	1.008	1.073	<b>0.015</b>
Others	1.047	0.015	1.019	1.076	<b>0.001</b>
<b>Wealth index</b>					
Poor <sup>†</sup>	1.000	-	-	-	-
Middle	0.994	0.013	0.969	1.020	0.664
Rich	0.964	0.014	0.937	0.991	<b>0.010</b>
Richest	0.878	0.018	0.844	0.913	<b>0.000</b>
<b>Occupation</b>					
Not working <sup>†</sup>	1.000	-	-	-	-
Professional & clerical	0.974	0.024	0.927	1.022	0.280
Agricultural & domestic	0.964	0.018	0.929	1.000	0.052
Sales & services	1.029	0.015	1.000	1.059	0.050
Manual	0.993	0.017	0.961	1.028	0.702
<b>Woman's education</b>					
No education <sup>†</sup>	1.000	-	-	-	-
Primary	0.963	0.013	0.937	0.989	<b>0.006</b>
Secondary	0.866	0.019	0.831	0.904	<b>0.000</b>
Higher	0.787	0.028	0.734	0.844	<b>0.000</b>
<b>Partner's education</b>					
No education <sup>†</sup>	1.000	-	-	-	-
Primary	0.989	0.017	0.957	1.022	0.516
Secondary	0.929	0.018	0.894	0.965	<b>0.000</b>
Higher	0.941	0.024	0.895	0.989	<b>0.016</b>
<b>Partner's age</b>					
≤ 24 <sup>†</sup>	1.000	-	-	-	-
25-34	1.368	0.042	1.288	1.453	<b>0.000</b>
35-44	1.626	0.053	1.526	1.733	<b>0.000</b>
45 and above	1.746	0.059	1.635	1.865	<b>0.000</b>
<b>Literacy</b>					
Cannot read at all <sup>†</sup>	1.000	-	-	-	-
Able to read	0.960	0.011	0.938	0.983	<b>0.001</b>
Others	0.948	0.047	0.860	1.046	0.287
<b>Media access</b>					
Has no access <sup>†</sup>	1.000	-	-	-	-
Has access	0.983	0.010	0.963	1.003	0.088
<b>Age at first birth</b>	0.954	0.001	0.951	0.957	<b>0.000</b>

<sup>†</sup> is a Reference category, AOR is the Adjusted Odds Ratio, CI is the Confidence Interval at 95%; the assessment was based on gsem at n=11,371 and p < 0.05

The findings in Table 8 show that married women aged 25-34 who had more children were 87% (AOR=1.87, 95%CI=1.80-1.94) where as those aged 35-49 years with the same number of children were thrice more likely to have unintended pregnancies as compared to those less than 25 years (AOR=2.79, 95%CI=2.68-2.91). Furthermore, women from northern region who had more children were 3% (AOR=0.97, 95%CI=0.94-1.00) less likely to have unintended pregnancies as

compared to their counter parts in the central region while those from rural areas were 5% more likely experience unintended pregnancy compared to those in urban areas with the same number of children (AOR=1.05, 95%CI=1.02-1.09). Muslims who had more children were 4% (AOR=1.04, 95%CI=1.01-1.07) more likely to have unintended pregnancies compared to the Catholics with the same number of children. Additionally, married women from rich and richest households having who had more children were respectively 4% (OR=0.96, 95%CI=0.94-0.99), and 12% (AOR=0.88, 95%CI=0.84-0.91) less likely to experience unintended pregnancy compared to the poor. Still, as the level of education among married women increased, their intention to have unintended pregnancies reduced with those with primary, secondary, and higher education level having 4% (AOR=0.96, 95%CI=0.94-0.99), 13% (AOR=0.87, 95%CI=0.83-0.90), and 21% (AOR= 0.79, 95% CI=0.73-0.84) respectively reduced odds unintended pregnancies as compared to married women who had no education but with the same number of children. Additionally, women whose husbands had at least secondary or higher level of education respectively had 7% (AOR=0.93, 95%CI=0.89-0.97), and 6% (AOR=0.94, 95%CI=0.90-0.99) reduced odds of having unintended pregnancies compared to women whose husbands had no education but with the same number of children. Also, as the husband's age increased, the probability for a woman to have unintended pregnancy also increased with those aged 25-34, 35-44, and above 44 years to respectively having increased odds of 37%, 63%, and 75% respectively as compared to women whose husbands were less than 25 years and yet had the same number of children (AOR=1.37, 95%CI=1.29-1.45; AOR=1.63, 95%CI=1.53-1.73; AOR=1.75, 95%CI=1.64-1.87 respectively). Similarly, married women who were able to read were 4% (AOR=0.96, 95%CI=0.94-0.98) less likely to have unintended pregnancies as compared to those who could not read at all but with the same number of children. Similarly, increasing age at first birth of a woman was significantly associated with a slight reduction in the odds of unintended pregnancy through the number of children born (AOR=0.95, 95%CI=0.95-0.96).

**Table 9: Indirect determinants of Unintended Pregnancies through Contraceptive use**

<b>Variable</b>	<b>AOR</b>	<b>Std. Err</b>	<b>95% CI</b>		<b>p-value</b>
<b>Woman's age</b>					
15-24 <sup>†</sup>	1.000	-	-	-	-
25-34	1.444	0.097	1.265	1.647	<b>0.000</b>
35-49	0.840	0.081	0.696	1.015	0.072
<b>Region</b>					
Central <sup>†</sup>	1.000	-	-	-	-
Eastern	0.777	0.058	0.671	0.900	<b>0.001</b>
Western	0.761	0.056	0.658	0.880	<b>0.000</b>
Northern	0.546	0.044	0.467	0.638	<b>0.000</b>
<b>Place of residence</b>					
Urban <sup>†</sup>	1.000	-	-	-	-
Rural	0.859	0.060	0.749	0.986	<b>0.031</b>
<b>Religion</b>					
Catholic <sup>†</sup>	1.000	-	-	-	-
Anglican	1.247	0.066	1.123	1.384	<b>0.000</b>
Muslim	0.992	0.074	0.857	1.150	0.918
Others	0.940	0.061	0.827	1.068	0.343
<b>Wealth index</b>					
Poor <sup>†</sup>	1.000	-	-	-	-
Middle	1.286	0.079	1.140	1.451	<b>0.000</b>
Rich	1.524	0.106	1.330	1.746	<b>0.000</b>
Richest	1.806	0.174	1.494	2.182	<b>0.000</b>
<b>Occupation</b>					
Not working <sup>†</sup>	1.000	-	-	-	-
Professional & clerical	1.416	0.162	1.132	1.771	<b>0.002</b>
Agricultural & domestic	1.618	0.139	1.367	1.915	<b>0.000</b>
Sales & services	1.208	0.078	1.065	1.371	<b>0.003</b>
Manual	1.303	0.101	1.120	1.516	<b>0.001</b>
<b>Woman's education</b>					
No education <sup>†</sup>	1.000	-	-	-	-
Primary	1.858	0.131	1.618	2.134	<b>0.000</b>
Secondary	2.114	0.213	1.735	2.576	<b>0.000</b>
Higher	1.859	0.287	1.373	2.516	<b>0.000</b>
<b>Partner's education</b>					
No education <sup>†</sup>	1.000	-	-	-	-
Primary	1.622	0.135	1.378	1.909	<b>0.000</b>
Secondary	1.942	0.181	1.617	2.331	<b>0.000</b>
Higher	2.059	0.248	1.625	2.607	<b>0.000</b>
<b>Partner's age</b>					
≤ 24 <sup>†</sup>	1.000	-	-	-	-
25-34	1.543	0.119	1.327	1.795	<b>0.000</b>
35-44	1.464	0.139	1.216	1.763	<b>0.000</b>
45 and above	0.952	0.103	0.770	1.178	0.653
<b>Literacy</b>					

Cannot read at all <sup>†</sup>	1.000	-	-	-	-
Able to read	1.428	0.079	1.281	1.591	<b>0.000</b>
Others	1.062	0.254	0.665	1.696	0.802
<b>Media access</b>					
Has no access <sup>†</sup>	1.000	-	-	-	-
Has access	1.192	0.057	1.086	1.308	<b>0.001</b>
<b>Children ever born</b>	1.213	0.015	1.184	1.243	<b>0.000</b>

<sup>†</sup> is a Reference category, AOR is the Adjusted Odds Ratio, CI is the Confidence Interval at 95%; the assessment was based on gsem at n=11,371 and  $p < 0.05$

The results in Table 9 indicate that married women aged 25-34 years who were using contraceptives were 44% (AOR=1.44, 95%CI= 1.27-1.65) more likely to experience unintended pregnancies as compared to their counterparts who were less than 25 years and were also using contraceptives. Similarly, married women from the northern, western, and eastern regions who were using contraceptives were respectively 45%, 24%, and 22% less likely to experience unintended pregnancy compared to their counterparts in the central (AOR=0.55, 95%CI=0.45-0.64; AOR=0.76, 95%CI=0.66-0.88; and AOR=0.78, 95%CI=0.67-0.90 respectively). Anglican married women who were using contraceptives were 25% more likely to experience unintended pregnancies as compared to the Catholics (AOR=1.25, 95%CI=1.12-1.38). Additionally, as the wealth index of the households improves, the risk of a married woman to experience unintended pregnancy increases with those who were using contraceptives from middle, rich, and richest wealth index respectively being 29% (AOR=1.29, 95%CI=1.14-1.45), 52% (AOR=1.52, 95%CI=1.33-1.75), and 81% (AOR=1.81, 95%CI=1.49-2.18) more as compared to the poor. Employed women who were using contraceptives were more likely to experience unintended pregnancies as compared to women who were not working with those engaged in agriculture & domestic sector having the highest risk of 62% (AOR=1.62, 95%CI=1.37-1.92). Women with primary, secondary, and higher education level who were using contraceptives were all twice more likely to experience unplanned pregnancies compared to those who were not educated (AOR=1.86, 95%CI=1.62-2.13; AOR=2.11, 95%CI=1.74-2.56; and AOR=1.86, 95%CI=1.37-2.52 respectively). The results still revealed that as the level of education increased among partners of married women who were using contraceptives, their intention to have unintended pregnancies increased as well with those whose partners had attained primary, secondary and higher being 62%, 94%, and thrice respectively compared to those who were illiterates (AOR=1.62, 95%CI=1.38-1.91; AOR=1.94, 95%CI=1.62-2.33; and AOR=2.06, 95%CI=1.63-2.61 respectively). Married women who were using contraceptives and their partners were aged 25-34,

and 35-44 were respectively 54% (AOR=1.54, 95%CI=1.33-1.80), and 46% (AOR=1.46, 95%CI=1.22-1.76) more likely experience unintended pregnancies compared to those whose partners were less than 25 years. Similarly, married women who could read and write as well as used contraceptives were 43% more likely to experience unintended pregnancies as compared to those who could not read at all (AOR=1.43, 95%CI=1.28-1.59). More still, married women who were using contraceptives and able to access any form of media were 19% (AOR=1.19, 95%CI=1.09-1.31) more likely to experience unintended pregnancies as compared to those who had no access to any form of media. The results still revealed that as the number of children born to married women who were using contraceptives increased, the risk of unintended pregnancy also increased by 21% (AOR=1.21, 95%CI=1.18-1.24) as compared to those with few children.

**Table 10: Regression diagnostics of the two models**

<b>Models</b>	<b>Degrees of Freedom</b>	<b>AIC</b>
Model with all variables	127	239,006.7
Model with selected variables	84	227,254.2

From Table 10 above, the second model (with a smaller AIC) was able to fit the data well and indicated that the variables that were dropped had no significant effect on the model.

## **Discussion**

The main objective of the study was to explore the determinants of unintended pregnancy among currently married women in Uganda. Results showed that almost 45% of the pregnancies were unintended. Still, unintended pregnancy was directly associated with woman's: age, region, wealth index, occupation, education level, children ever born, contraceptive use; and as well as partner's age, and education level.

Findings show that the prevalence of unintended births reduces gradually with increasing age of married women. This was consistent with the findings in India, and Malawi [25], [3]. This could be to the fact that as older women may be more knowledgeable and informed of the different methods of contraception to unplanned pregnancies. Secondly, young married women may also be reluctant and fear to openly discuss family planning issues with their partners or even seek guidance from health personnel.



Married women from northern Uganda were at a higher risk of getting unintended pregnancy as compared to their counterparts in the central region. However, women from western region were less likely to have unintended pregnancy as compared to those in the central. This was in agreement with earlier findings [8], [10]. This could be attributed to differences in infrastructures like better roads and health facilities which makes access to different health services a problem especially in the northern region of the country.

The results also reveal that; as the economic status of the married woman improves, her intention to have unintended pregnancy reduces. Married women from the highest wealth quintile were less likely to experience unplanned pregnancies as compared to those in the lowest wealth quintile. This is consistent with studies in Bangladesh, Malawi, USA, and Iran [26], [3], [27], [28]. This is because women from wealth households have knowledge, information and better access to health services.

This study also shows that women with primary or secondary level education were more likely to have unintended pregnancy as compared to women with no education. This resonated with other findings [31, 34, 35]. Relatedly, women whose partners were more educated were more likely to experience unintended pregnancy as compared to those who were illiterates. However, this contradicted with the findings among married women in Pakistan [31]. It is known that couples who are well educated are associated with lower odds of unintended pregnancies compared to less educated couples [5]. This is because a better form of education empowers a couple with knowledge, information and decision making and thus reduce the chance of having unintended pregnancy. The deviation in this finding could be that: less educated women and men are not aware of the value of a small family since they are associated with higher fertility and therefore are less likely to report that their pregnancies were unintended as compared to educated women. However, there is need to further investigate this discrepancy by looking at the education level different between the couples on unintended pregnancy.

As the age of the partner increased, the intention of his wife to have unplanned pregnancy reduced. This implies that women married to young partners are exposed to higher sexual risks like unplanned pregnancies contrary to other findings [32]. This is because older men could have reached their desired family sizes and therefore opt for measures to stop further pregnancies which may not be the case with younger men.

In regard to parity, the total number of children a married woman has significantly affects her risk of having unintended pregnancy. The higher the parity, the higher the risk of unintended pregnancy. This correlated other findings in Nigeria [33]. High parity women have limited knowledge and access of contraceptives which in turn results to contraceptive failure or non-use of contraceptives to limit or stop further pregnancies.

Furthermore, women who were using contraceptives were more likely to have unintended pregnancy as compared to those who were not using contraceptives. This was consistent with previous studies in Bangladesh, Pakistan, and Nigeria [39-41]. This probably could be attributed to: method failure, decision making on the proper method use and inadequate sensitization on the different contraceptive methods used.

We also found out that unintended pregnancy through contraceptive use was indirectly influenced by women's: age, region, place of residence, religion, wealth index, occupation, education level, literacy, media, children ever born; husband's age and educational level. Married women aged 25-34 years who were using contraceptives were more likely to experience unintended pregnancies as compared to their counterparts who were less than 25 years. Similarly, married women from the northern, western, and eastern regions who were using contraceptives were less likely to experience unintended pregnancy compared to their counter parts in the central.

Anglican married women who were using contraceptives were more likely to experience unintended pregnancies as compared to the Catholics. This finding contradicts with the strong doctrines in the Catholic faith on contraception [36] and therefore further research has to be done to explore this discrepancy. Also, the education level attained by married women through contraceptive use significantly affected the risk of having unintended pregnancies. The strange finding reflected that educated married women who were using contraceptives were more likely to experience unplanned pregnancies compared to those who were not educated but were also using contraceptives. Additionally, married women from rich households, those employed and those whose husbands were more educated who were using contraceptives were more likely to experience unintended pregnancies as compared to the poor, unemployed and those with illiterate partners. It is expected that as the household wealth improves or education level improves from none to higher education, the risk of using modern contraceptive among women increases [37],

thereby lowering the risk of unintended pregnancies. This could be attributed to in correct contraceptive use and method choice among the different categories of women.

Furthermore, married women whose husbands were older and were using contraceptives were more likely experience unintended pregnancies compared to women with younger partners.

Older men could also have reached their desired family size and therefore their wives are likely to report unintended pregnancies due to contraceptive failure as compared to younger men.

Another surprising result showed that married women who could read and write and were using contraceptives were more likely to experience unintended pregnancies as compared to those who could not read at all but were also using contraceptives. This may partly be attributed to contraceptive failure and knowledge on proper use. Still, married women who were using contraceptives and able to access any form of media (television, radio or newspapers) were more likely to experience unintended pregnancies as compared to those who had no access to any form of media but were using contraceptives. Exposure exposes women to a lot of information on use of different contraceptive methods to reduce unintended pregnancy which is contrary to this study. This could be associated to contraceptive failure though there is need to investigate media access specifically on family planning through children ever born on unintended pregnancy.

The findings still revealed that the total number of children a woman had through contraceptive use influenced her intention to have unintended pregnancies. Married women with more children and yet were using contraceptives were more likely to experience unintended pregnancies compared to those with few children. Higher fertility is associated with low contraceptive knowledge and higher contraceptive failure.

Further, the indirect effect on unintended pregnancy through children ever born were established by women's: age, region, place of residence, religion, wealth index, education level; husband's education, husband's age, and Age at first birth. As the age of married women increased, their risk of having unintended pregnancy also increased. Older married women who had more children were more likely to report unintended pregnancy as compared to the young ones. This is because young married women may not have reached their desired family size and therefore less likely to report unintended pregnancies compared to older married women with the same number of children.

Also, women from northern region who had more children were less likely to have unintended pregnancies as compared to their counterparts in the central region. This is because of the married women from Central are not meeting their desired family size due to higher fertility. Married women who had more children and were from rural areas were more likely to experience unintended pregnancy compared to those in urban areas with the same number of children. This is because, rural places are disadvantaged with better health facilities and the better infrastructures like roads making access to contraceptives a big problem compared to urban places. Therefore, the more children in urban areas are likely to have been planned for as compared to those among women in rural areas.

More still, Muslim women who had more children were more likely to have unintended pregnancies compared to the Catholics with the same number of children. This could be attributed to the differences in religious marriage teachings. A Catholic married man is only entitled to one wife and therefore making it easy to decide upon the possible family size which may not be the case in a Muslim family that has more than one wife.

As the economic status among married women improved, their intention to have unintended pregnancies through children ever born reduced significantly. Wealthier women can easily access contraceptives to ensure that all the children they have are planned. The results also show that; as the level of education among married women increased through children ever born, their intention to have unintended pregnancies reduced. Women with higher education are assumed to have a more in-depth knowledge about the benefits and risks of unintended pregnancies as compared to those who are illiterates. Therefore, the large number of children of an educated woman are more likely to have been planned.

Women whose husbands were educated were less likely to have unintended pregnancies compared to women whose husbands had no education but with the same number of children. This is because education empowers men to make better decisions for their families and understand the benefits of a small size. Furthermore, the results still revealed that as the husband's age increased through the number of children born to a woman, the probability for a woman to have unintended pregnancy also increased. Older men could also have reached their desired family size and therefore their wives are likely to report unintended pregnancies as compared to younger men.

Similarly, married women who were able to read were less likely to have unintended pregnancies as compared to those who could not read at all but with the same number of children. This shows that women who could read and write can easily negotiate with their partners to have planned children compared to those who are illiterates.

Still, a rise in age at first birth of a woman reduces the risk of unintended pregnancy through the number of children born. This implies that married women who have their first birth at a late age are likely to have planned children and a small family size as compared to those who initiate birth at an earlier age.

### **Limitations**

The data used was cross sectional and therefore was limited in providing an understanding of the timing of unintended pregnancy. Women's perception on whether the pregnancy was planned or wanted can change over time. Pregnancy intention asked in the early stage of pregnancy is more likely to give an accurate answer than those at the late stage of pregnancy or even after delivering and the different cases are not reflected in the survey.

Despite the above limitation, reliable data and appropriate methods were used hence the findings reflect accurately the determinants of unintended pregnancy among currently married women in Uganda. The large size of this study and its likely representativeness was a great strength as well.

### **Conclusion**

In the study, it was found out that the prevalence of unintended pregnancy is still very high and the rate of contraceptive use is also very low. Still, married women already burdened with higher fertility were reported to suffer more from unintended pregnancy. Regional differences, religion, mass media, partner's demographic factors and improper use of contraceptive use were significantly noted to influence unintended pregnancies. Therefore, the government should invest in programs and policies like sensitization of women on the effectiveness in use of contraceptives, followed by distribution of free, long-acting and quality contraceptive methods especially to those women who already have four or more children. Also, extension of higher education to all people will lead to reduced risks of unintended pregnancies. This will in turn help these women and their families meet their needs, improve their health, reduce on public expenditure in the health sector and also improve their academic achievement.

## **Abbreviations**

GSEM: Generalized Structural Equation Model; MOH: Ministry of Health; UBOS: Uganda Bureau of Statistics; UDHS: Uganda Demographic and Health Surveys.

## **Ethical consideration**

The approval to use the Uganda DHS 2016 database was sought from the ICF International and confidentiality of respondents was also maintained.

## **Author contribution**

The study was RW's final year master's thesis that was supervised by AK and LA. The manuscript was written by RW and AK. All the authors read and approved the manuscript.

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## **Availability of data and materials**

The datasets used for this study are available from the demographic health and survey website upon request using <http://dhsprogram.com/data/>

## **Consent for publication**

Not applicable.

## **Competing interests**

The authors declare that they have no competing interests

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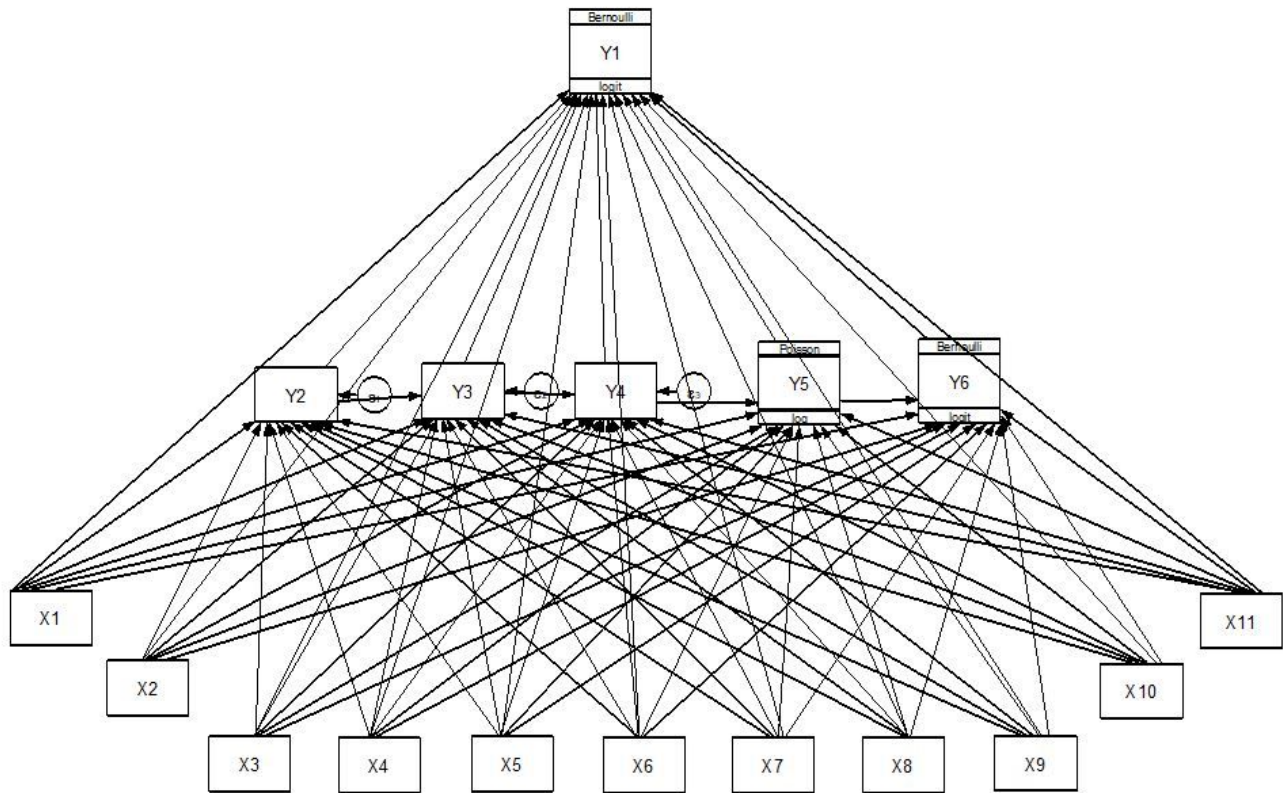
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# Figures



**Figure 1**

The gsem model showing the selected exogenous and endogenous