

# Determinants of Time from Last Birth to the First Use of Contraceptives: Evidence from the Egypt Demographic and Health Survey

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**Abstract** Multilevel survival models can be applied where the data have the hierarchical nature. Three common models are used in this case. They are the discrete time survival models with mixed effects, the Cox proportional hazard model with mixed effects and the Weibull survival model with mixed effects. The Egyptian Demographic Health Survey (EDHS 2014) data target 21,762 ever-married women aged 15-49. This article aims to determine the factors that may affect the time from the last birth of a woman to the first use of contraceptives. Due to the hierarchical nature of EDHS data, multilevel survival analysis is employed. The above three models are applied to EDHS 2014 data. The Weibull survival model with mixed effects proved to be the best model to fit the survival time. Moreover, it is found that only 25% of the sampled women have not used contraceptives until almost one year from their last birth. In addition, attaining higher education, increasing the age at first sex and breastfeeding contribute to the more efficient use of contraceptives. In addition, the article recommends enhancing family planning campaigns which have a powerful impact on the behavior of women in Egypt for the optimal use of contraceptives.

**Keywords** Contraceptives, Kaplan-Meier Estimate, Cox Proportional Hazard Model Mixed Effects Models, Multilevel Survival Analysis

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## 1. Introduction

Overpopulation problem is very critical in developing countries such as Egypt. A solution to this problem is to support the culture of contraception use. The World Health Organization (WHO) recommends that after a live birth, an interval of 24 months is preferred before attempting to become pregnant. Yilmazel and Balci [1] indicated that out of all the women in reproductive age (15-49 years) in Turkey, 73% use a contraceptive method. Only 46% of them use an effective method. Abraha et al. [2] reported that 47% of all Ethiopian pregnancies occur within a short birth interval of less than 24 months after the preceding birth. Consequently, awareness of postpartum women, as the group of interest, is highly required to be addressed due to their ignorance of being at risk of pregnancy even during breastfeeding.

The awareness of the factors that may affect the time between giving birth and first use of contraceptives leads to the more efficient contraceptive use. Some of those factors are related to the woman's characteristics and some are household's characteristics. The woman's factors may include age, educational level, breastfeeding, body mass

index and media exposure.

*Woman's age:* Magnusson et al. [3] studied data from the first release of the National Survey of Family Growth (NSFG) in USA. The data consist of 7,356 women aged 15–44 years, collected between July 2006 and December 2008. They found that the average age at first sex is 17.5 years in the sample and experiencing first sex before age 15 was associated with an increased risk of an inconsistent use of contraceptives in the year prior to interview. Firman et al. [4] concluded that the age of woman is an important factor in determining the potential of using contraceptives. They used data that consists of 4,456 women from the third British National Survey of Sexual Attitudes and Lifestyles in the reproductive age. They found that less than 10% of 16–24-year-old women at risk of unintended pregnancy were using an unreliable or no contraceptive method. However, almost one-fifth of women aging 24–35 years were using an unreliable or no method. Eventually, 38.1% of women aging 35–49 years were using an unreliable or no method. In addition, they concluded that women's age at the first sex has a significant effect on the potential use of contraceptives. Ariho and Kabagenyi [5] highlighted the importance of age at first marriage in determining the levels and trends of fertility in Uganda during the period 2006–2016. There was an increase in the proportion of women with age at first marriage as 20+ and a decrease in those with age at first marriages below 15. They concluded that rising age at first marriage is very important for the achievement of significant declines on fertility.

*Woman's educational level:* Stanfors and Larsson [6] concluded that the educational level is a crucial factor of contraceptive use in Sub-Saharan Africa. Ahmed and Zahangir [7] found that women with secondary or higher education levels have significantly higher odds of contraceptive use compared to those who were illiterate, after adjusting for many confounders such as total children ever born, number of living children, desire of more children, wealth index, respondent currently working, region and religion.

*Breastfeeding:* Van Duong [8] showed that breastfeeding may reduce the probability of being pregnant and improves the health of children. The study concluded that women should use contraceptives before the sixth week, especially if they are not breastfeeding.

*Woman's body mass index:* The body mass index can play a role in taking the decision of using contraceptives after giving birth. Bhuvu et al. [9] concluded that obese women were more likely to use contraceptives than normal-weight women.

*Family planning campaigns (media exposure):* Parr [10] reported that fertility in Ghana has fallen sharply for women who are exposed to family planning campaigns via the media. Jacob et al. [11] stated that, in Africa, family planning campaigns via media do not reach poorer, less educated and more rural residents. This may affect the extent of knowledge of modern contraceptives use.

Moreover, household characteristics also affect the woman's decision to use contraceptives after giving birth. Factors relate to household characteristics, as addressed by literature, may include the socio-economic status, the household size, and the place of residence ([5], [12], [13], and [14]).

*Socio-economic status:* Adebawale et al. [12] concluded that the socio-economic status of the household quantified by its wealth index can make a significant difference. They found less use of contraceptives among women in the poorest than their counterparts in the highest wealth index quantile.

*Household size:* Jayaraman et al. [13] reported that contraceptive use increases when the number of sons in the family increases in South Asia. Ariho and Kabagenyi [5] mentioned that family size preferences played a key role in the observed changes in fertility in Uganda. They found that the number of children preferred had a significant effect on Uganda's observed changes in fertility between 2006 and 2016.

*Place of residence:* The place of residence can contribute to the intention of using contraceptives. Eliason et al. [14] mentioned that increasing urbanization have increased the risk for the unintended pregnancy in the postpartum period.

The aim of this article is to examine the factors that affect contraceptive use after giving birth in Egypt, especially, in the postpartum period. The study is based on data from the Egypt Demographic and Health Survey (EDHS) 2014. The EDHS data have a hierarchical structure, where the data fall at two-levels (in this case, women at level 1 nested within households at level 2). Hence, a multilevel survival analysis is adopted to model such a data structure. The study reviews some parametric and semi-parametric multilevel survival models as proposed by literature. Moreover, the study aims to select the best model that efficiently describe and fit the time from last birth to the first contraceptive use. The study introduces not only the first use of a survival analysis approach to the EDHS data but also the first formulation to the analysis in the perspective of the multilevel analysis approach. Data analysis is conducted using STATA (version 14) and RStudio (version 1.4.1106).

The rest of the paper is organized as follows. Section 2 describes the material and methods and introduces the used data (EDHS 2014). Also, the variables included in the analysis are presented. Section 3 is devoted to the data analysis using the suggested models, results, and the main findings. Eventually, discussion, conclusions and recommendations are presented in Section 4.

## 2. Material and Methods

### 2.1. Source of Data

The data is obtained from the Egyptian Demographic

Health Survey 2014 (EDHS). A total of 28,175 households have been selected in the final sample. This results in 21,762 eligible women according to final report of the EDHS [15]. It is worth mentioning that EDHS 2014 is the most recently published data; there is no survey conducted in Egypt later than that year.

The main response of interest in this study is the time from the last birth to the first use of contraceptives. The event of interest is the first use of contraceptives after the last birth. There is a hierarchical structure in the EDHS data, where individual woman aged (15-49) is the lower level (level 1). The individual woman is nested within the household level (level 2). Individuals have not been sampled independently from each other; they share common households, so the hazards of individuals experiencing the outcomes of interest are not independent. Hence, there are two main sources of variability in the EDHS data: the variability among individuals and the variability among households. This means that ignoring one or all of these sources of variation may lead to misleading conclusions. There is a need to integrate macro-level and micro-level information into a single model in order to understand the determinants of using contraceptives after the first birth.

**2.2. Variables Included in the Study**

The study targets the Egyptian women in the reproductive age (15-49 years old). The study aims at examining the factors that might potentially affect the time from their last birth to the first contraception. The outcome

(response) variable and the factors that may affect the response are presented. These factors are broadly classified into two levels: women-level factors (level 1) and household-level factors (level 2).

**Outcome (response) variable**

The outcome variable is the time from the last birth to the first use of contraceptives. The time between the last birth and the first use of contraceptives is determined using two questions. The first question asks about the year ( $Y_t$ ) at which the woman started using the contraceptive method. The second question asks about the time, in months, between the last birth to the interview ( $M_t$ ). Then, the quantity  $M_t$  is divided by 12 to convert it to years where the result is rounded up to have whole years. The year of last birth was obtained as  $M_t$  subtracted from 2014 (given the fact that all the interviews have been conducted in year 2014).

Censored cases are identified based on a 4-categories-question on the questionnaire; question 1 in Table (A-2) in Appendix A. It asks the respondent about their contraceptive use and intentions. The first two categories are merged to create a new category that represents all the users of contraceptives in the sample. The non-users that intended to use later are considered here as censored observations.

**Potential independent variables**

The potential factors that are anticipated to affect the outcome variable are presented in Table 1.

**Table 1.** List of the independent variables

Variable name	Variable name in the models' equations	Description
<b>I. Women-level variables</b>		
1. Age	AGE	Age of the respondent women (within the productive age class).
2. Residence	RES	Place of residence of the household which is often classified into urban/rural.
3. Education attainment	EDUC	Educational level of the respondent women is classified into four categories: (1) no education (or illiterate), (2) primary, (3) secondary and (4) university and above.
4. Breastfeeding status	BREAST	This variable describes whether the woman practices breastfeeding or not: (0) no breastfeeding and (1) breastfeeding.
5. Body mass index	BMI	According to EDHS (2014), BMI is defined as weight in kilograms divided by height in meters squared (kg/m2).. A BMI below 17 indicates severe under-nutrition. A BMI from 17 to below 18.5 indicates thinness or acute under-nutrition. A BMI of 25 or above indicates overweight or obesity Normal BMI is from 18.5 to less than 25.
6. Age at first sex	AGE_SEX	The age of the first sexual intercourse.
7. Husband's employment status	H_EMP	This variable describes whether the husband has a job or not: (0) no job and (1) has a job.
8. Husband's age	H_AGE	Age of the husband.
9. Media exposure index	MEI	An index that measures the extent of the woman's exposure to the family planning campaigns in the media (radio, television, or newspapers) using three questions that ask each woman if she heard about family planning from any of the three kinds of media. Each response is recorded as a binary variable with (0) no and (1) yes. Finally, the index is calculated as the mean of the score of the three responses for each woman and then divided into 3 categories: (1) low, (2) medium and (3) high.

Table 1. Continued

II. Household-level variables		
10. Household size	HH_SIZE	Number of persons living together in one house.
11. Children number	CH_NUM	Number of children living together in one house.
12. Household Wealth index	WIS	According to EDHS (2014), the wealth index is a composite measure of a household's cumulative living standard. The wealth index is calculated using easy-to-collect data on a household's ownership of selected assets, such as televisions and bicycles; materials used for housing construction; and types of water access and sanitation facilities.

Source: EDHS 2014 Survey questionnaire

### 3. Data Analysis and Results

#### 3.1. Kaplan-Meier Estimates

The first approach that is used to analyze the data is the Kaplan-Meier (KM) method. Kaplan-Meier is a nonparametric approach also termed as product-limit approach. Curve of KM estimates is shown in Figure 1. The results show that only 25% of the sampled women have not used contraceptives until almost one year from their last birth. After almost 23 years from their last birth, all the women have already used the contraceptives.

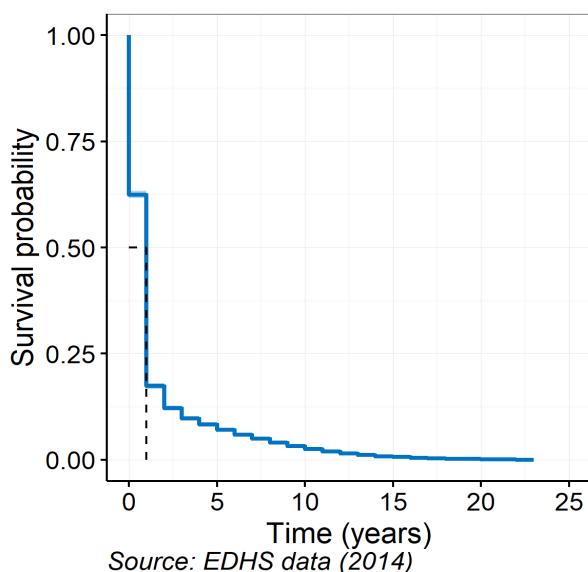


Figure 1. Kaplan-Meier survival estimates (ever-married women aged 15-49)

Moreover, Figure B-1 (in Appendix B) shows non-significant differences for the survival estimates among the women residing in the urban and rural areas (where the p-value of the log-rank test equal 0.5). On the other hand, husband's employment status and breastfeeding have a positive impact on the potential use of contraceptives. Precisely, based on Figures B-2 (in Appendix B and Figure B-3 (in Appendix B), having an employed husband and practicing breastfeeding,

respectively, strongly affect the potential of using the contraceptives after giving birth (for both p-value of the log-rank test is less than 0.001). Furthermore, the higher the education level of the woman, the more likely to use contraceptives after giving the last birth (see Figure B-4, Appendix B) where log-rank test p-value is less than 0.0001). Nevertheless, the extent of exposure to the family planning campaigns slightly increases the potential for the women to use the contraceptives or not (see Figure B-5 (in Appendix B) where the p-value of the low-rank test equals 0.025).

The next three subsections will discuss the multilevel survival models that can be applied to the EDHS data to fit the outcome variable (time from last birth to the first contraception). For a complete discussion and practical implementation to such models, readers may refer to [16], [17], [18] and [19].

#### 3.2. Discrete Time Survival Models with Mixed Effects

Discrete time survival models can be used if the time to the event ( $T$ ) is discrete, as whole years, using a discrete version of the hazard function. The discrete hazard function in this context is defined as the conditional probability that an event occurs in interval  $t$  for individual  $i$  nested in cluster  $j$  given that the event has not yet occurred prior to the interval  $t$  [20], and can be given as follows:

$$h_{tij} = Pr(T_{ij} = t | T_{ij} \geq t) \quad (1)$$

This can be applied using a regression model for binary outcomes to model the probability of the occurrence of an event within each interval. A general discrete-time linear model to describe the dependence of the probability on the time  $t$  and a vector of explanatory variables  $\mathbf{X}_{tij}$  can be given by

$$g(h_{tij}) = \delta^T \mathbf{Z}_{tij} + \beta^T \mathbf{X}_{tij} + \alpha_i, \quad (2)$$

where  $g(\cdot)$  is the link function,  $\mathbf{Z}_{tij}$  is a vector of functions of  $t$  with coefficients  $\delta$  and  $\delta^T \mathbf{Z}_{tij}$  that defines the baseline logit-hazard, and  $\alpha_j$  is the random intercept that contributes to the individual-specific term that often assumed to be normally distributed with mean 0 and scalar variance  $\sigma^2$  [20].

The logit link function, the probit link function, or the

complementary log-log link function can be used for the generalized linear models. Discrete survival models can account for the homogeneity within the clusters using random effects. The model in (1) is referred to as a two-level random intercept model. Furthermore, the discrete time survival model can be used in case of continuous survival time. In this situation, the follow up times are divided into finite discrete intervals.

The output of the multilevel discrete time survival model to the EDHS dataset is shown in Table A-1. The results show that the household effect is significant under 10% significance level when adapting the discrete time survival model with mixed effects to model the EDHS data. That means that the hierarchical structure of the data affects the responses of the women under study. For the women-level characteristics, the results show that for a year increase in woman age, the hazard of using the contraceptives decreased by 3% approximately. The hazard of using contraceptives for the urban residents is, significantly (p-value is less than 0.01), greater than the hazard of the rural residents by nearly 19%. There is insignificant difference between the hazard of using contraceptives for the primary-educated women compared to the uneducated women. For education levels higher than the primary level, increasing the level of education affects significantly and positively the hazard of using the contraceptives (p-value is less than 0.01). Since the hazard of using contraceptive increases by almost 26% for the secondary-educated women and by 30% for the higher-educated women compared to the uneducated women.

The women who practice breastfeeding are more likely to use the contraceptives by about 38% compared to the women who do not practice breastfeeding. The body mass index has a weak significant effect on the hazard of using contraceptives as one more score increases the hazard by only 0.006%. The older the woman at her first sex increases the potential for using the contraceptives as one more year increases the hazard of using contraceptives by almost 2%. The exposure to the family planning programs at the media significantly increases the hazard of using contraceptives (p-value is less than 0.01). Having an employed husband increases the hazard of using the contraceptives by almost 13% compared to the women with unemployed husbands. For the household-level characteristics, it is concluded that the household size has no significant positive effect on the hazard of using the contraceptives. However, one more child increases the hazard of using contraceptives by nearly 30%. The hazard of using the contraceptives increases by nearly 15% if the wealth index increases by 1 unit.

**3.3. Cox Proportional Hazard Model with Mixed Effects**

One of the semi-parametric models which is widely used in survival analysis is *Cox proportional hazard model*. The Cox proportional hazard model, for each individual, takes

the following form

$$h(t, \mathbf{X}) = h_0(t) \exp(\sum_{k=1}^q \beta_k X_k) \tag{3}$$

where  $h(t, \mathbf{X})$  is the hazard at time  $t$ ,  $h_0(t)$  is baseline hazard (non-parametric part in the model),  $\mathbf{X} = (X_1, X_2, \dots, X_q)^T$  is a vector of covariates and  $\beta = (\beta_1, \beta_2, \dots, \beta_q)^T$  is a vector of regression parameters to be estimated. This model can be extended to model the hierarchical structure of the data to be as follows:

$$h_j(t, \mathbf{X}) = h_0(t) \exp(\xi_j + \sum_{k=1}^q \beta_k X_k) \tag{4}$$

where  $\xi_j$  is the random intercept associated with cluster  $j$  [21].

The results show that the household effect is not significant (p-value is larger than 0.1). The proportional hazard assumption is not satisfied for four variables. These variables are age, number of children, age at first sex, and breastfeeding status. A remedy for that is to add interaction terms with time to the four variables, except for the breastfeeding variable as it is binary. Hence, stratification process for the main model has been applied to have two sub-models, one for the women practice breastfeeding and another one for the women who do not practice breastfeeding. For the women who do not practice breastfeeding, the results in Table A-1 show that the hazard of using the contraceptives decreases by 3% approximately as the age increases by one year. The older the woman at her first sex by one year increases the potential for using the contraceptives by almost 4% and the hazard of using the contraceptives decreases by almost 1%. The educational level of the woman, her place of residence, the wealth index and the body mass index do not have any significant effect on the hazard of using contraceptives. For the household-level characteristics, one more member in the family increases the hazard of using contraceptives by almost 2.2% and one more child in the family increases it by almost 9.4% and the hazard of using contraceptives increases by 2.2% for each year. Increasing the wealth index by one score increases the hazard of using the contraceptives by 3%.

**3.4. Weibull Survival Model with Mixed Effects**

Crowther [19] has defined proportional hazards parametric multilevel models as follows:

$$h_{ij}(t) = h_0(t) \exp(\mathbf{x}_{ij}^T \beta + \mathbf{z}_{ij}^T \mathbf{b}_j) \tag{5}$$

where  $h_0(t)$  is the baseline hazard function,  $\mathbf{x}_{ij}$  is the design matrix of the fixed effects  $\beta$  and  $\mathbf{z}_{ij}$  is the design matrix of the random effects ( $\mathbf{b}_j$ ) for the  $i^{\text{th}}$  individual in the  $j^{\text{th}}$  cluster. Crowther [19] assumed that  $\mathbf{b}_j$ , the random effects, follow multivariate normal distribution  $N(\mathbf{0}, \Sigma)$ .

Figure 1 show that the survival times seem to be monotonically decreasing. This suggests that the appropriate model for the survival times is the Weibull survival model with mixed effects, to investigate the

impact of the household structure of the data on the responses of the women. Table A-1 presents the results of the Weibull model. The results show that the household effect is significant. The results show that every year increase for the age of woman reduces the hazard of using the contraceptives by 11% approximately.

The place of residence does not affect the hazard of using contraceptives. The primary-educated and the women with higher education are more likely to use the contraceptives by 10% and 11% respectively compared to the uneducated women. This means that the educational status is a highly significant factor for using the contraceptives. The women who practice breastfeeding are more likely to use the contraceptives by about 64% compared to the women who do not practice breastfeeding.

The body mass index has a weak significant effect on the hazard of using contraceptives. An increase of score of the body mass index increases the hazard by only 0.0073%. The older the woman at her first sex increases the potential for using the contraceptives as an increase of one year increases the hazard of using contraceptives by almost 10%. Husband employment status and the extent of exposure to family planning campaigns do not affect the hazard of using any contraceptives. For the household-level characteristics, it is concluded that increasing the household size has a significant positive effect on the hazard of using the contraceptives; 3% for one more member. In addition, one more child increases the hazard of using contraceptives by nearly 27%. Increasing the wealth index by one score increases the hazard of using the contraceptives by almost 2%.

The Akaike's Information Criteria (AIC) and the Bayesian Information Criteria (BIC) are used to compare the four models. The AIC are 17,285, 17,887, 22,895 for the Weibull model, the discrete model and the Cox model, respectively. The BIC are 17,424, 18,018, and 22,988 for the Weibull model, the discrete model and the Cox model, respectively. Hence, the Weibull survival model with mixed effects is the best fit for the data as it has the least value for AIC and BIC. This result coincides with the literature results.

#### 4. Discussion and Concluding Remarks

The findings from the analysis show that the household characteristics in Egypt are important in determining the potential use of contraceptives after giving birth. These include the household size, number of children and the wealth index of the household.

The findings also show the high impact of the woman's characteristics in Egypt on the potential use of contraceptives after giving birth. These concludes that the older the women, the less likely to use contraceptives.

Moreover, the educational level of women is a vital factor for using contraceptives after giving birth. The more educated the woman, the more likely to use a suitable contraceptive method. This is obvious from both the Kaplan-Meier survival estimate curves for the educational level and the modeling results. Moreover, practicing breastfeeding can play an important role in using the contraceptives as the women who breastfeed their children are more likely to use the contraceptives. Furthermore, increasing the age at first sex can contribute to the more efficient use of contraceptives. On the other hand, unfortunately, the role of family planning campaigns via media seems to have no significant effect toward the attitudes of women of using contraceptives after birth in Egypt. This result contradicts with results about other countries where the role of media is very related to the more efficient contraceptive use ([10], [11]).

This study has some strengths. Firstly, the sample chosen in this study is a large and nationally representative. Therefore, the results are generalized to Egyptian women under this category. Secondly, the included variables have no missing values and that enhances the accuracy of the results. Finally, the analyses account for the multilevel structure of the EDHS data by using multilevel models.

However, the study has some limitations. Firstly, the EDHS data are self-reported by the interviewed women themselves. Hence, it may suffer from misreporting bias. Secondly, the nature of the data is cross-sectional and that limits the scope to interpret causal association. Thirdly, EDHS data latest publishment was in 2014 where there are no surveys conducted in Egypt later than that year. Hence, the conclusions of the study may be thought to be restricted to that time. However, this limitation does not have that much significant concern due to the coincidence of the results of the current study to many recent literatures (e.g. [4], [5], [7], [9]).

Many conclusions and recommendations can be drawn from the results. First, the more efficient use of contraceptives, after giving birth, contributes to decrease the growth of an over-populated country such as Egypt. Second, improving the educational level of the women increases the use of contraceptives. Third, the easy access of contraceptives to each woman is crucial. Hence, reducing the cost of contraceptives especially for poor women in the rural areas is highly recommended. Fourth, the importance of the breastfeeding should be highlighted for the Egyptian women for the more effective family planning. Finally, effective family planning campaigns may raise the awareness of the Egyptian women to use a suitable contraceptive method in an appropriate age. Thus, the article recommends that the role of family planning campaigns must be activated to have a powerful impact on the behavior of women in Egypt for the optimal use of contraceptives.

## Appendix A

**Table A-1.** Results of Multilevel Survival Analysis of the Duration from Last Birth to First Use of Contraceptive (Hazard ratios, AIC and BIC of the models)

Variable	Model 1 Discrete time survival model with mixed effects				Model 2 extended Cox model with mixed effect for the women who don't breastfeed					Model 3 Weibull survival model with mixed effect			
	Hazard ratio	St. Err.	[95% Conf. Interval]		Hazard ratio	St. Err.	Interaction with time	[95% Conf. Interval]		Hazard ratio	St. Err.	[95% Conf. Interval]	
AGE	0.9662***	0.0024	0.9617	0.9707	0.9676***	0.0045	-0.0156***	0.9588	0.9764	0.8891***	0.0034	0.8824	0.8958
2.RES (urban)	1.1887***	0.0305	0.7923	0.8931	0.9667	0.0395		0.8893	1.0441	0.9493	0.0332	0.8842	1.0144
EDU 1 (primary)	1.2667	0.0392	0.9482	1.1057	1.054500	0.0529	-	0.9508	1.1582	1.1038**	0.0503	1.0052	1.2024
2(secondary)	1.257639***	0.0298243	1.1862	1.3333	1.018614	0.0395799	-	0.9410	1.0962	1.040213	0.0361679	0.9693	1.1111
3 (higher)	1.303489***	0.0419728	1.2005	1.4153	1.092478	0.0615692	-	0.9718	1.2132	1.111904**	0.0547628	1.0046	1.2192
1.BREAST (yes)	1.3775***	0.0282757	1.3032	1.4559						1.639825***	0.0559114	1.5302	1.7494
BMI	1.0001***	0.0000171	1.000033	1.0001	1.00004	0.0000246	-	0.9999	1.0001	1.000073***	0.00024	0.9996	1.0005
AGE_SEX	1.018818***	0.0031291	1.0126	1.0251	1.037596***	0.0061007	0.0096***	1.0256	1.0496	1.099154***	0.0046881	1.0900	1.1083
1.H_JOB (has)	1.1318*	0.06517	0.9961	1.2860	0.9889359	0.0801625	-	0.8318	1.1461	1.013716	0.0782855	0.8603	1.1672
H_AGE	0.984541***	0.0014742	0.9817	0.9874	0.9967265	0.0028875	-	0.9911	1.0024	0.9964316	0.0025653	0.9914	1.0015
MEI 2(media)	1.1614***	0.0222659	1.1118	1.2132	1.032609	0.030146	-	0.9735	1.0917	1.02872	0.262404	0.5144	1.5430
3 (High)	1.18503***	0.0484426	1.0777	1.3031	0.9013738	0.057525	-	0.7886	1.0141	0.9058599*	0.0503229	0.8072	1.0045
H_SIZE	1.0003	0.0046303	0.9913	1.0095	1.022342**	0.0088512	-	1.0050	1.0397	1.025511***	0.0066684	1.0124	1.0386
WIS	1.1548***	0.0118343	1.1284	1.1819	1.030453*	0.0161232	-	0.9989	1.0621	1.023385*	0.0138735	0.9962	1.0505
CH_NUM	1.2981***	0.0081133	1.2777	1.3189	1.093548***	0.0188093	0.0224369***	1.0567	1.1304	1.274508***	0.01555933	1.2440	1.3050
Household variance	0.0030897*	0.0024699	1.0006	1.0149	1.27 e <sup>-14</sup>	0		-	-	0.0101845***	0.0039685	0.0024	0.0180
AIC	17886.97				22894.71					17285.31			

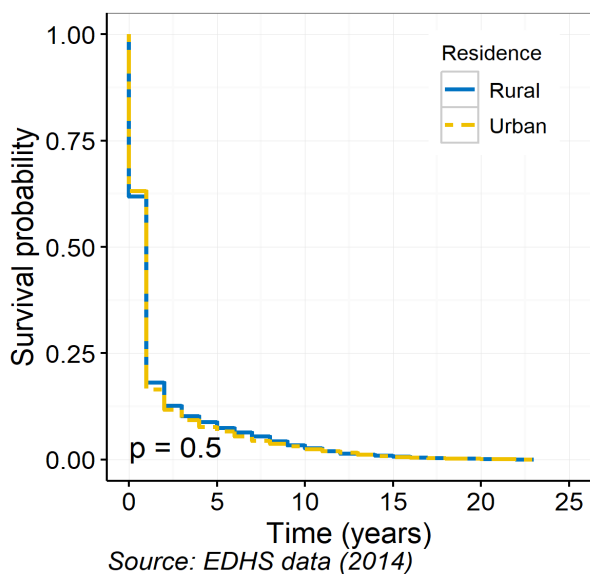
\*\*\*Significant at 0.01 level      \*\*Significant at 0.05 level      \*Significant at 0.1 level

**Table A-2.** Questions used from the EDHS survey

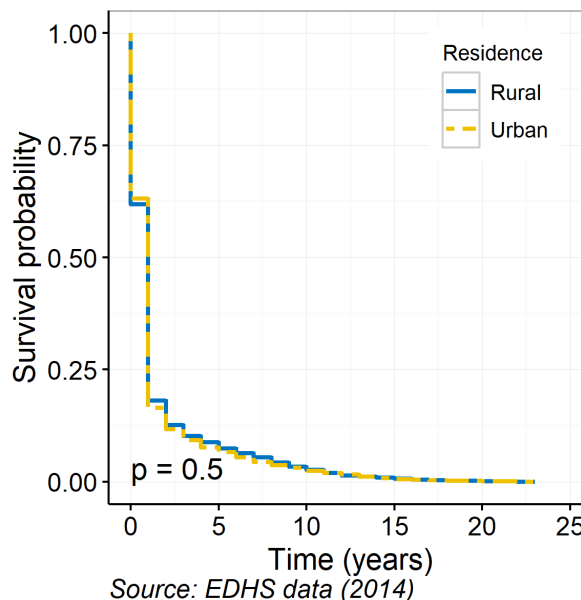
Question	Choices (if existed)															
1. Contraceptives use and intentions	<table border="1"> <tr><td>USING MODERN METHOD</td><td>1</td></tr> <tr><td>USING TRADITIONAL METHOD</td><td>2</td></tr> <tr><td>NON-USER-INTENDS TO USE LATER</td><td>3</td></tr> <tr><td>DOES NOT INTEND TO USE</td><td>4</td></tr> </table>	USING MODERN METHOD	1	USING TRADITIONAL METHOD	2	NON-USER-INTENDS TO USE LATER	3	DOES NOT INTEND TO USE	4							
USING MODERN METHOD	1															
USING TRADITIONAL METHOD	2															
NON-USER-INTENDS TO USE LATER	3															
DOES NOT INTEND TO USE	4															
2. The time from last birth to the interview (in months)	-															
3. How old were you at your last birthday?	-															
4. Place of residence	<table border="1"> <tr><td>URBAN</td><td>1</td></tr> <tr><td>RURAL</td><td>2</td></tr> </table>	URBAN	1	RURAL	2											
URBAN	1															
RURAL	2															
5. What is the highest level of school you attended?	<table border="1"> <tr><td>PRIMARY</td><td>1</td></tr> <tr><td>PREPARATORY</td><td>2</td></tr> <tr><td>SECONDARY</td><td>3</td></tr> <tr><td>UPPER INTERMEDIATE</td><td>4</td></tr> <tr><td>UNIVERSITY</td><td>5</td></tr> <tr><td>MORE THAN UNIVERSITY</td><td>6</td></tr> </table>	PRIMARY	1	PREPARATORY	2	SECONDARY	3	UPPER INTERMEDIATE	4	UNIVERSITY	5	MORE THAN UNIVERSITY	6			
PRIMARY	1															
PREPARATORY	2															
SECONDARY	3															
UPPER INTERMEDIATE	4															
UNIVERSITY	5															
MORE THAN UNIVERSITY	6															
6. Did you ever breastfeed?	<table border="1"> <tr><td>YES</td><td>1</td></tr> <tr><td>NO</td><td>2</td></tr> </table>	YES	1	NO	2											
YES	1															
NO	2															
7. How old were you when you started living together with your (first) husband?	-															
8. During the past 6 months have you heard about family planning: (multiple answers is allowed)	<table border="1"> <tr> <td>• On the radio?</td> <td>YES</td> <td>1</td> <td>NO</td> <td>2</td> </tr> <tr> <td>• On the television?</td> <td>YES</td> <td>1</td> <td>NO</td> <td>2</td> </tr> <tr> <td>• In a newspaper or magazine?</td> <td>YES</td> <td>1</td> <td>NO</td> <td>2</td> </tr> </table>	• On the radio?	YES	1	NO	2	• On the television?	YES	1	NO	2	• In a newspaper or magazine?	YES	1	NO	2
• On the radio?	YES	1	NO	2												
• On the television?	YES	1	NO	2												
• In a newspaper or magazine?	YES	1	NO	2												
9. What is your husband's occupation?	-															
10. How old was your husband on his last birthday?	-															
11. You have had in TOTAL ____ births during your life.	-															
12. Total persons in household.	-															

Source: EDHS 2014 Survey questionnaire

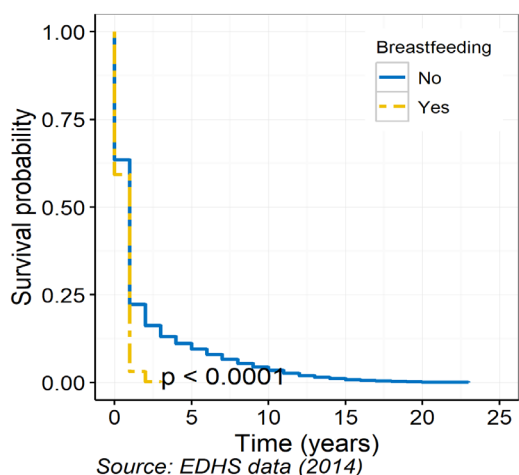
**Appendix B**



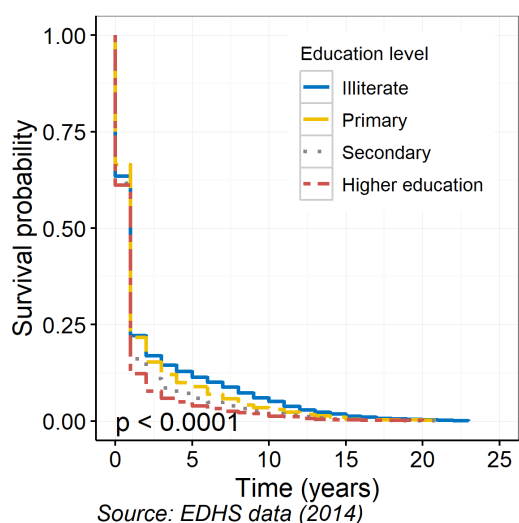
**Figure B-1.** Kaplan-Maier survival estimates curves by place of residence



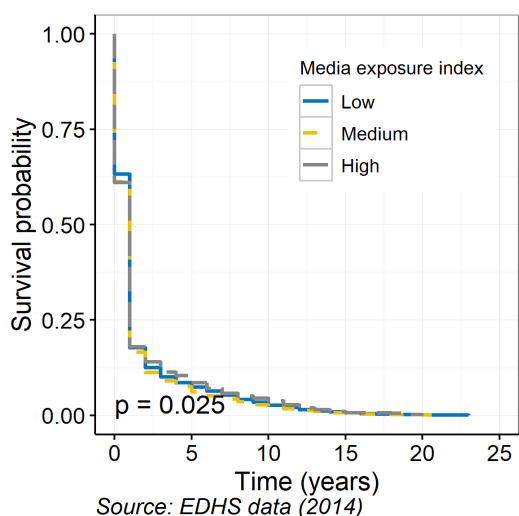
**Figure B-2.** Kaplan-Maier survival estimates curves by husband's employment status



**Figure B-3.** Kaplan-Maier survival estimates curves by breastfeeding status



**Figure B-4.** Kaplan-Maier survival estimates curves by educational level



**Figure B-5.** Kaplan-Maier survival estimates curves by media exposure index

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