Female Education and Contraception Choice: Evidence from Cameroon

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Abstract

This paper aims to analyze the association between female education and the contraception choice using data from the most recent Demographic and Health Survey combined with Multiple Indicator Clusters (DHS-MICS)in Cameroon. Econometric results show that female education is strongly associated with the contraception choice of women. Educated women are more oriented towards modern contraception methods than traditional methods even if the use of both types of methods improves with female education. This result is robust when we consider only women in union or only women not in union but sexually active. For women not in union, but sexually active, female education attainment starts to be significantly associated with the traditional contraception choice at the secondary education level. These results show that, female health pathways and fertility dynamics in Cameroon can be improved by encouraging education of young girls to further their studies till secondary education level.

Keywords: Education attainment - Contraception choice – Multinomial Probit – Cameroon.

JEL Classification: A2, I0, C1

1. Introduction

Ensuring access to contraceptive methods is essential to securing the wellbeing and autonomy of women, while supporting the health and development of communities (World Health Organization 2014). By decreasing the complications of pregnancy, childbirth and exposure to AIDS, the use of contraception has the potential to reduce maternal morbidity and mortality. Contraception enables women to plan also their families in terms of timing and spacing of pregnancies and the number of births (Ilyas et *al.* 2011). This ability to plan empowers women in spheres outside the home, allowing them to participate in paid employment (Andalon et *al.* 2014). Despite this, many women in the developing countries do not have access to contraception and express a negative intention to use contraceptive methods (Babalola et *al* 2015).

In many parts of the world, especially in Asia and Latin America, the use of contraceptive methods has increased, but in sub-Saharan Africa, it continues to be low. Globally, despite the fact that the use of modern contraception has risen from 48% in 1990 to 57% in 2012, an estimated 222 million women in developing countries would like to delay or stop childbearing but are not using any method of contraception. In Africa, the proportion of women aged 15-49 reporting the use of a modern contraceptive method has raised minimally from 24% to 27% between 2008 and 2012 whereas in Asia, Latin America and the Caribbean it has remained at 61% and 67% respectively (World Health Organization 2014). In Cameroon, despite the proactive policy puts in place by the Government to control population growth, the use of contraceptive methods remains low. Indeed, the contraceptive prevalence of married women turned down from 26% in 2004 to 23.4 % in 2011 (INS 2012), and modern contraceptive prevalence of married women remained low and relatively constant during the same period (from 13 % to 14%). Also, only 16% of non-pregnant women aged 15-45 report use of modern contraceptive methods (INS 2012).

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Supporting access to use of contraception through effective policies and programs can accelerate progress toward achieving the sustainable development goals and family planning 2020 global goals (PRB 2017).

Therefore, there is a huge interest among policy makers in understand the drivers of women's use of contraception (PRB 2017). Some evidence suggests that the most important barrier to contraceptive use in developing nations is relative to a lack of knowledge about contraception (Bulatao 1998). Given the influence of the contraception on fertility (Tawiah 1997; Saleem and Bobak 2005) and the large differences in fertility rates between more and less educated women within countries could imply that this lack of knowledge is more important amongst those with little education. In Cameroon, the educational level of women aged 15-49 is still lagging, since 20 % of women in Cameroon have no education (against only 8% of men), and similarly, only 41% had reached secondary school level against 50% of men (INS 2012). This raises the question of whether education affects the use of contraception.

The effect of women education on the desires and reproductive behavior has been widely documented in the economic and demographic literature (Ilyas et *al.* 2011; Gubhaju 2008). Theoretically, this effect can be described through the standard microeconomic model of fertility (Becker 1992) where the labour market is an important channel of the reproductive behavior. By improving the incomes of women in the labor market, education increases the opportunity cost of leaving the labour market to raise children (Cygan-Rhem and Maeder2013). This *substitution effect* implies optimal fertility choices of women leading to a reduced number of children. Although the income due to high education can produce an *income effect* which can facilitate household to look after several children, this *income effect* could be weakened if parents with high income prefer good quality children. Therefore, more investment in each child is high, more the number of children is reduced. The use of contraceptive methods appears therefore as a means by which educated women are able to minimize the indirect costs associated with the extensive fertility.

Furthermore, education can produce an "*incarceration effect*" because enrollment in the education system may be incompatible with motherhood (Cygan-Rhem and Maeder 2013). In this vein, education can encourage backs pregnancy and encourage women to use contraceptive methods to comply with school requirements. Another canal education affects the contraception choice is autonomy, since education increases the independence and autonomy of women in their ability to make decisions for their health and in the household (Gordon et al. 2011). Finally, educated women could learn and effectively use contraceptive methods compared to uneducated women (Ilyas 2011), since educated women are more likely to have positive attitudes vis-à -vis of family planning, and to have a better knowledge of reproductive health. They are more likely to visit health centers in order to learn about their health and the most effective contraceptive methods. These capabilities allow education to increase the probability of a woman to use contraception compared to women with no education (Gordon *et al.* 2011) as shown by Bbaale and Mpuga (2011) who established that in Uganda, female education especially at the secondary and post-secondary levels increase the likelihood of using contraceptives.

If the positive association between education and contraception use is now well documented, the way education influences on the contraceptive method choice still needs to be investigated (Gubhaju 2008 and Robinson 1996) due to the mixed results led by this literature. Larson and Stanford (2014) found for example that education mattered less in the choice of method effectiveness in Kenya, since the impact of education was non-existent. Several studies show that educated women are more likely to use modern rather than traditional contraceptive methods because they are more aware of and they have more access to the most effective methods of birth control (Alpu and Fidan 2006). Therefore, educated women could find traditional methods of contraception less effective, notably withdrawal methods or periodic abstinence (Gubhaju 2008; Robinson 1996). However, using traditional methods requires cooperation with the male partner (i.e. sufficient autonomy) and the knowledge of the menstrual cycle to effectively observe periodic abstinence or withdrawal. In this sense, educated women are more aware of their menstrual cycle and able to persuade their partners to cooperate during the withdrawal and abstinence (Bulatao 1989). By this way, even educated women could use efficiently traditional methods than non-educated women. Consequently, the way education influences on the contraceptive method is most empirical, since it is not easily determined ex-ante. The objective of this paper is to examine the relationship between female education and the contraceptive method choice in Cameroon using recent DHS data.

The rest of this paper is organized as follows. The second section presents the theoretical framework of the study and the thirdsection develops the methodological approach and describes data that will be used. In the fourth section, econometric results are discussed. The fifth section concludes.

2. Theoretical Framework

Our theoretical framework of contraception use is based on the general structural household model of Rosenzweig and Schultz (1983), modified by Bbaaleand Mpuga (2011) to study the relationship between female education, contraceptive use and fertility in Uganda. In this model, the household is assumed to maximize a utility function subject to children, health production functions, children, time constraints and the budget. The utility of a typical household is a function of the number of children (C), child health (H_C), consumption goods(X), leisure (Le) and taste(α). In the model, children are treated as a special form of good from which satisfaction is derived even as they involve an opportunity cost of time and financial resources required to bring them up. Thus, the household is assumed to maximize a utility function in the standard microeconomics as follow:

$$U = U\left(C, H_c, X, Le, \theta\right) \quad (1)$$

In this model, there are two household production functions, especially for health and fertility. The production function of fertility includes a term for the number of children that a couple would have without engaging in any contraception minus a function of contraception inputs that reduce the number of children a couple can have. We have then,

$$C = \lambda - C_1(Z) \quad (2)$$

Whereλ and Z refer to the number of children without contraception and contraceptive inputs respectively. This model considers also a production function for child health(H_C)that includes as arguments health inputs to the health outcome of the child. Some health inputs (N) as medicines and may be purchased from the market at a price (p_N). To be efficient, the inputs need to be complemented with the time of the mother and the one of the father allocated to produce child health, education of the mother (E_M) and father(E_F) and innate endowments(α) of the child in health terms.

$$H_C = H_C\left(N, T_{CM}, T_{CF}, E_M, E_F, \alpha\right) \quad (3)$$

Since parents are limited in terms of time, this model introduces time constraints for the both parents, considering that parents allocate their time amongst activities as leisure (l), work (L) and child health producing (T_c). We have then for the both parents,

$$T_F = L_F + l_F + T_{CF}$$
$$\qquad\qquad\qquad\qquad\qquad\qquad\qquad\qquad (4)$$
$$T_M = L_M + l_M + T_{CM}$$

Where T the total time available; F and M are the indexes of the father and the mother. The model introduces also a budget constraint to match different health expenditures. Then, we can assume that household spend money on goods (X), child health inputs (N) and contraceptive inputs (Z). Furthermore, the total income of the household is equal to the labour income of the mother and the father as well as the exogenous non labour income. So,

$$p_N N + p_Z Z + p_X X = L_M w_M + L_F w_F + y \quad (5)$$

Where $p_N N$, $p_Z Z$ and$p_N X$ are the cost of market purchased child health inputs, the cost of contraceptive inputs, and the cost of consumption goods, respectively. w_M, w_F and$y$ are the labour income of the mother, the labour income of the father and the exogenous non labour income, respectively.

The maximization of the utility function in equation (1) subject to the set of equations (2-5) leads to the reduced form equations of endogenous variables written in terms of exogenous variables. These endogenous variables include contraception use, fertility, labour force participation and child health. However, our concern for this paper is only on contraception use as we can see in equation (6).

Exogenous variables include female and male wages, prices of contraception inputs and child health inputs, mother education, father education and non-labour incomes that can be approximate by household wealth(W).

The reduced form specification for contraception use Z that comes from the maximization problem expressed in equations (1-5) is as follow:

$$Z = Z\left(w_M, w_F, E_M, E_F, W, p_C, p_N, p_X, \alpha\right) \quad (6)$$

w_M, w_F are the mother's and father's wages rate. If these variables are important variables that may affect contraception use, their problem is that they are not easily available. Therefore, we approximate them with the employment status in the labour market.

3. Methodology and data

3.1. Estimation strategy

Women have the choice between modern contraceptive methods, traditional contraceptive methods (periodic abstinence or withdraw and others) and nothing. To analyze the effect of education on the contraceptive behavior, this study uses a multinomial Probit regression. This model is usually estimated because it has the advantage to overcome the IIA hypothesis required in models like multinomial logit model (Hensher and Greene 2003). Let consider U_{ij} the utilityfunction of an individual i that choose an option j in terms of contraception. We can write:

$$U_{ij} = S_{ij}\beta + \varepsilon_{ij} \quad (7)$$

Where S_{ij} isthe vector of explanatory variables. These variables include female education, the husband education and others demographic and socioeconomic variables commonly used in the literature of use of contraceptive determinants notably, age, location, religion, female employment status, woman employment status and the household income index.$\beta$is the vector of parameters to be estimated. ε_{ij} is the error term that represents the effect of non-observed factors on individual utility and choice. Given the fact that each contraception alternative method j is associated to a utility U_{ij}, women will choose a contraception alternative method only if this one gives him the highest utility amongst those available.

The probability that a woman $i$chooses the first contraceptive alternative j is expressed as follow:

$$P_{i1} = \mathrm{Prob}\left(U_{i1} > U_{ik}\right), k = 2,3. \quad (8)$$

or

$$P_{i1} = \mathrm{Prob}\left(U_{i1} > U_{i2}\ and\quad U_{i1} > U_{i3}\right) \quad (9)$$

$$P_{i1} = \mathrm{Prob}\left(\left(S_{i1}\beta - S_{i2}\beta\right) > \varepsilon_{i2} - \varepsilon_{i1}\ and\quad \left(S_{i1}\beta - S_{i3}\beta\right) > \varepsilon_{i3} - \varepsilon_{i1}\right) \quad (10)$$

$$= \mathrm{Prob}\left(\varepsilon_{12}^* < \left(S_{i1}\beta - S_{i2}\beta\right) and\quad \varepsilon_{13}^* < \left(S_{i1}\beta - S_{i3}\beta\right)\right) \quad (11)$$

$$= \int_{-\infty}^{\left(S_{i1}\beta - S_{i2}\beta\right)} \int_{-\infty}^{\left(S_{i1}\beta - S_{i3}\beta\right)} f\left(\varepsilon_{12}^*, \varepsilon_{13}^*\right) d_{\varepsilon_{12}^*} d_{\varepsilon_{13}^*} \quad (12)$$

$f\left(\varepsilon_{12}^*, \varepsilon_{13}^*\right)$is the joint density function ofε_{12}^*andε_{13}^*. This function follows a normal bivariate distribution. The multinomial Probit model describes by equations 8-12 will be estimated by the maximum likelihood method. For simplicity, it can be present as follow:

$$Y = aE + \gamma M + \mu \quad\quad\quad\quad\quad\quad\quad\quad (13)$$

Where Y is the dependent variable. E is the number of education years. M is a vector of covariates. μ is the vector of résiduels.α and γ are coefficients.

3.2. Data, descriptive statistics and definition of variables

Data used in this study are from the most recent Demographic Health Survey (DHS) available collected in a national level survey concomitantly with the Multiple Indicators Cluster Survey (MICS) in Cameroon in 2011. This survey was conducted under the stewardship of the National Statistical Institute of Cameroon. DHS-MICS is a household survey which provides at the national level, estimates of population indicators, health, nutrition and household characteristics. Information collected are based on individual interviews.

A Nationally representative sample of 14,214 households and 15,426 women aged 15-49 in the selected household has been interviewed. Among these women, 10513 are in union or not in union but sexually active. They constitute the sample of our analysis.

The dependent variable is measured by three modalities as follow:

$$Contraception\_choice = \begin{cases} 1 & if \quad Modern \quad methods \\ 2 & if \quad Traditional \quad methods \\ 0 & if \quad Nothing \end{cases}$$

Modern contraceptive methods include female sterilization, male sterilization, injectable IUD, pills, implants, male condom, lactation amenorrhea methods and standard day's methods. Traditional contraceptive methods include periodic abstinence or withdraw and other traditional contraceptive methods. Table 1 show the distribution of the contraception choice variable in the sample. About three quarters (73.06%) of women sexually active do not use contraception. The situation is dominant among women in union (76.57%) compared to women not in union but sexually active (43.29%). When women choose to use contraception, modern methods are more preferred (17.31%) than traditional ones (8.62%). However, modern contraception methods are more used among women not in union but sexually active. While 14.92% of women in union choose modern methods for their contraception needs, only 47.10% of women not in union but sexually active do the same choice. Also, while 9.61% of women not in union choose traditional methods for their contraception needs, only 8.51% of those in union take the same decision.

Table1. Descriptive statistics of the contraception choice variable

	In union N=9805		Not in union, but sexually active N=1155		The whole N=10960	
	%	S.E	%	S.E	%	S.E
No contraception	76.57	0.004	43.29	0.014	73.06	0.004
Modern methods	14.92	0.003	47.10	0.014	17.31	0.003
Traditional methods	8.51	0.002	9.61	0.008	8.62	0.002

Source: Author, using DHS-MICS2011

Concerning education, the central variable of this study, it is measured by the highest education level attainment of the woman. Four modalities of female education are retained as follow: 0 = no education, 1= primary education, 2=secondary education and 3=higher education. Each modality is treated as a dummy variable. In the analysis, the modality no education is considered as the reference. Table 2 shows that in the sample, the majority of women have attained the primary (32.71%) and the secondary (33.84%) education levels. About 8.23% of women have a higher education level. This proportion is lower for women not in union but sexually active (3.2%) compared to those in union (8.83%). Also, more women not in union, but sexually active have no education level (76.53%) compared with those in union (19.15%). The secondary education level is more attained by women in union (36.3%) than for women not in union but sexually active (12.90%).

Table2. Descriptive statistics of the education variable

	In union N=9,805		Not in union, but sexually active N=1,155		The whole N=10,960	
	%	S.E	%	S.E	%	S.E
No education	19.15	0.003	76.53	0.012	25.20	0.004
Primary	35.71	0.004	7.35	0.007	32.71	0.004
Secondary	36.30	0.004	12.90	0.009	33.84	0.004
Higher	8.83	0.002	3.20	0.005	8.23	0.002

Source: Author, from DHS-MICS 2011

Table 3 shows indications on the association between female education and the contraception choice. It appears from all the Pearson chi-square statistics that the two variables are strongly associated, as their probability are lower than 0.01.

Table3. Association between female education and contraception choice

	In union	Not in union, but sexually active	The whole
	Contraceptive choice	Contraceptive choice	Contraceptive choice
Female education	**Pearson chi2 (6) = 744.78** **Probability =0.000** **N=9,805**	**Pearson chi2 (6) = 17.81** **Probability =0.007** **N= 1,155**	**Pearson chi2 (6) = 364.22** **Probability =0.000** **N=10,960**

Source: Author, from DHS-MICS 2011

Above female education, various covariates are included in the contraception choice. It is the case for partner's education attainment, age, wealth status, location, fertility, religion or region. The partner's education variable is defined and categorized in the same way than the female education attainment with four categories. Age is a continuous variable that captures the fact that younger women compared to older women, may be more dynamic and more willing to utilize modern contraceptives (BbaleandMpuga 2011). So, as women get older, they are less likely to use modern methods than traditional methods. The location is also expected to be associated to the contraception choice. Women living in urban areas can express a higher desire for smaller families compared to those living in rural areas. They may also be likely to use modern contraceptive methods than rural women because of greater access to modern methods, health centers or pharmacies. The variable location is defined as follow: 1= urban and 0 = rural. Religion is included in the model to capture the traits and the beliefs of women in different religious affiliations (Mubita-Ngoma and Kadantu 2011; Mahmood and Ringheim 1996). It is defined as follow: 1= Christians, 2= Musulms and 3= Other religious affiliations. Household wealth status of the woman is defined by three modalities from the five deciles of the wealth index: 1= "the poor" modality includes women belonging to the two lowest deciles of the wealth index; 2 = the "not poor" modality includes women belonging to the middle decile of the wealth index; 3 = the "rich" modality includes women belonging to the two highest deciles of the wealth index.

Table 4 gives descriptive statistics in the sample. It appears that 89.5% of women are in union while 10.5% are not in union but sexually active. Also, 37.1% of women are between 15 and 24 years old and 34.8% are belong 25 and 34 years old. However, women in union are older than those not in union but sexually active. More than 46.8% of women live in urban areas. Also, more women belonging to rich households are not in union (59.3%) compared with those in union (39.7%). Children in live are more important among women in union compared with women not in union but sexually active. In fact, 54.9% of women in union have between 2 and 5 children while 24.5% of women not in union but sexually active have the same number of children in live. This situation could justify the fact that women not in union but sexually active use contraceptive methods more than those in union. The sample includes more Christians (72.5%) than Muslims (21.3%). However, among women not in union but sexually active, 89.6% are Christians and only 7.4% are Muslims.

Table4. Descriptive statistics

Variables	Women in union				Women not in union but sexually active				The whole			
	Obs.	Mean	Min	Max	Obs.	Mean	Min	Max	Obs.	Mean	Min	Max
Contraception (Ref: Nothing)												
Modern	9805	0.149	0	1	1155	0.470	0	1	10960	0.183	0	1
Traditional	9805	0.085	0	1	1155	0.096	0	1	10960	0.086	0	1
Age (Ref: More than 34)												
15-24	9805	0.343	0	1	1155	0.242	0	1	10960	0.371	0	1
25-34	9805	0.360	0	1	1155	0.242	0	1	10960	0.348	0	1
Religion (Ref: Other religion)												
Christian	9805	0.705	0	1	1155	0.896	0	1	10960	0.725	0	1
Muslims	9805	0.230	0	1	1155	0.074	0	1	10960	0.213	0	1
Female education (Ref: No education)												
Primary	9805	0.230	0	1	1155	0.279	0	1	10960	0.383	0	1
Secondary	9805	0.324	0	1	1155	0.596	0	1	10960	0.352	0	1
Higher	9805	0.036	0	1	1155	0.088	0	1	10960	0.041	0	1
Partner's education (Ref: No education)												
Primary	9805	0.357	0	1	1155	0.073	0	1	10960	0.327	0	1
Secondary	9805	0.363	0	1	1155	0.129	0	1	10960	0.338	0	1
Higher	9805	0.088	0	1	1155	0.032	0	1	10960	0.082	0	1
Wealth status (Ref: Poor)												
Not poor	9805	0.205	0	1	1155	0.191	0	1	10960	0.204	0	1
Rich	9805	0.397	0	1	1155	0.593	0	1	10960	0.417	0	1
Location (Ref: Rural)												
Urban	9805	0.445	0	1	1155	0.659	0	1	10960	0.468	0	1
Children in live (Ref: More than 5)												
0-1	9805	0.282	0	1	1155	0.723	0	1	10960	0.329	0	1
2-5	9805	0.549	0	1	1155	0.245	0	1	10960	0.517	0	1

Source: Author, using DHS-MICS2011

4. Econometric results and discussions

Table 5 gives results of the multinomial Probit estimations of the contraception choice. The Chi-square statistics show that the model is globally significant. The reference modality of the contraceptive choice is no contraception. The two first columns of the whole sample and of each subsample give estimates without the partner's education as independent variable and the two last columns give estimations with the variable partner's education included in the model. Globally, there are not too much changes before and after the inclusion of the partner's education in the model. Almost all the variables included in the model explain significantly the female contraception choice in Cameroon. Exception is done with the location, in contrary with the expectation that the exposure to urban areas eases access to health centers, pharmacies and modern contraceptives methods. This result does not confirm the one obtained in Uganda by Bbale and Mpuga (2011).

In the whole sample, female education is strongly and positively associated with the contraception choice. In fact, moving from no education levels to at least primary education influences positively and significantly the probability to use modern or traditional contraception methods relatively to no contraception option.

Even the control of estimates by the partner's education does not influence the sign or the strength of the association. Precisely, a woman who moves from a no education situation to the primary education level increases by 7.6% the probability to use modern contraceptive method rather than being a non-contraceptive user. This probability increases with the level of education. For example, moving from no education level to secondary education or higher education levels increases respectively by 16.8% and 28.2% the probability to use modern contraception methods rather than being a non-contraceptive user. These results show that educated women are more oriented towards modern contraception methods than tradition methods even if utilization of both types of methods improve with female education. This positive association between education and both modern and traditional contraception use could be explained by the fact that education can encourage backs pregnancy and encourage women to use contraceptive methods to comply with school requirements. It could also be translated through autonomy, since education increases the independence and autonomy of women   in their ability to make decisions for their health and in the household (Gordon et *al.*2001).

At the same time, the passage from a no education situation to primary, secondary and higher education increases respectively by 3.6%, 6% and 7% the probability to use a traditional contraceptive method relatively with not using contraception. This result could find explanation in the fact that using traditional methods require cooperation with the male partner and the knowledge of the menstrual cycle to effectively observe periodic abstinence or withdrawal. By this way, educated women must be more aware of their menstrual cycle and more able to persuade their partners to cooperate during the withdrawal and abstinence (Bulatao 1989). Moreover, traditional contraception methods use increases with education, probably because educated women are more aware of and have more access to the most effective methods of birth control by visiting health centers in order to learn about their health and the most effective contraceptive methods (Alpu and Fidan 2006). Thus, they could find traditional methods of contraception less effective, notably withdrawal methods or periodic abstinence (Gubhaju 2008; Robinson 1996).

When analysis is made according to the union status of women, the positive and significant association between female education and the contraceptive behavior is maintained. However, some differences appear between women in union and those not in union but sexually active. For women in union, when we include the male partner's education in the model, moving from no education to primary, secondary and higher education levels, women increase by 2.1%, 3.8% and 4.7% the likelihood to choose traditional contraceptive method rather than a no contraception option. Also, when we move from a no education situation to primary, secondary and higher education level respectively, they increase by 3.4%, 9.1% and 14.6% the probability to use modern contraceptive methods. This positive and significant association between female education and contraception method choice appears probably because the bargaining power of educated women in union increases their capacity to convince their partners to use contraception. Concerning women not in union but sexually active, female education begins to be positively and significantly associated with the use of traditional contraceptive method from the secondary education level. An explanation of this result may be the fact that the autonomy, the independence and the bargaining power of women not in union vis à vis of their partner is high when their education level also is high. It is this higher education level that give women not in union the power to use withdrawal or abstinence methods. This situation is not the case for the choice of modern contraception methods. Even a low level of education is significantly associated with an increase in the use of modern contraceptive methods. In fact, for women in union, moving from no education level to primary, secondary and higher education increases respectively the probability of using modern contraception methods by 3.7%, 4.9% and 47.4% respectively, rather than being a non-contraceptive user.

Above female education, others variables are positively associated with modern contraceptive use. There are differences in the contraception behavior according to religion. Contrary to Christians who do not have a significant difference with others religion affiliations in term of contraception, Muslims are less favorable to use contraception methods even traditional ones than others religions. When we disaggregate the sample according to the union status, the association between religion and the contraception behavior disappears for women not in union. Also, the wealth index improves the probability to use contraceptive (traditional and modern) methods rather than being a non-contraception user.

Relatively to women belonging to poor households, those belonging to non-poor or rich households have a higher probability to choose modern and traditional contraception methods rather than not using any contraceptive method. This result is similar with the one obtained by Gereltuya et *al.* (2007) who found that Mongolian women living in households where insufficient are less likely to use contraceptive compared to women living in households where income is sufficient. However, when we disaggregate the sample, it appears that only women belonging in rich households present a higher probability to use traditional and modern contraception methods relatively to women belonging to poor households. We also found that fertility differences influence women contraception behavior in Cameroon. In fact, the more women have children in live, the more they use contraception, modern or traditional rather than not using any of them. Finally, partner's education attainment is an important predictor of the female contraception behavior in Cameroon. In the whole sample, we can see that on the contrary of Gereltuya et *al.* (2007) in Mongolia, partner's education attainment is negatively associated with the choice of traditional and modern contraception methods. However, when we only consider women in union, it appears that partner's education attainment is negatively and strongly associated with the choice of traditional and modern methods.

Table 5. Contraception method choice estimations

VARIABLES	(1) WOMEN IN UNION				(2) WOMEN NOT IN UNION BUT SEXUALLY ACTIVE				(3) THE WHOLE			
	Modern	Traditional	Modern	Traditional	Modern	Traditional	Modern	Traditional	Modern	Traditional	Modern	Traditional
Age	0.167	0.085***	0.014	0.083***	0.102*	0.047	0.105*	0.054	-0.034*	0.042*	-0.004	0.049**
	(0.020)	(0.024)	(0.020)	(0.024)	(0.055)	(0.063)	(0.055)	(0.063)	(0.017)	(0.021)	(0.018)	(0.021)
Age2	-0.000**	-0.001***	-0.000*	-0.001***	-0.002***	-0.001	-0.002***	-0.001	0.000	-0.000***	-0.000	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
Female education												
(No education)												
Primary	0.430***	0.586***	0.266***	0.421**	1.428***	0.549	1.432***	0.581	0.491***	0.606***	0.830***	0.713***
	(0.098)	(0.156)	(0.108)	(0.743)	(0.469)	(0.639)	(0.476)	(0.643)	(0.094)	(0.148)	(0.112)	(0.152)
Secondary	0.860***	0.949***	0.632***	0.743***	2.015***	1.116*	2.073***	1.184*	1.004***	1.023***	1.302 ***	1.109***
	(0.106)	(0.167)	(0.115)	(0.176)	(0.473)	(0.639)	(0.479)	(0.639)	(0.101)	(0.160)	(0.113)	(0.163)
Higher	1.201***	1.056***	0.844***	0.818**	2.325***	1.384**	2.438***	1.493**	1.364***	1.168***	1.622***	1.260***
	(0.147)	(0.196)	(0.159)	(0.212)	(0.507)	(0.671)	(0.513)	(0.674)	(0.128)	(0.187)	(0.142)	(0.197)
Partner education												
(No education)												
Primary			0.302***	0.432**			0.288	0.046			-0.670***	-0.262***
			(0.116)	(0.184)			(0.262)	(0.330)			(0.079)	(0.098)
Secondary			0.433***	0.572***			-0.198	-0.285			-0.660***	-0.196**
			(0.116)	(0.184)			(0.203)	(0.279)			(0.076)	(0.097)
Higher			0.667***	0.584***			-0.527**	-0.491			-0.543***	-0.225***
			(0.139)	(0.196)			(0.341)	(0.425)			(0.097)	(0.120)
Children in live	0.133***	0.159***	0.137***	0.161***	0.107***	0.141**	0.106*	0.150***	0.094***	0.147***	0.112***	0.151***
	(0.014)	(0.015)	(0.014)	(0.015)	(0.052)	(0.056)	(0.054)	(0.058)	(0.013)	(0.015)	(0.014)	(0.015)
Householdwealthstatus (Poor)												
Not poor	0.491***	0.314***	0.475***	0.297***	0.164	0.575**	0.158	0.573	0.408	0.339***	0.446***	0.348***
	(0.090)	(0.087)	(0.090)	(0.088)	(0.216)	(0.264)	(0.216)	(0.264)	(0.084)	(0.085)	(0.087)	(0.086)
Rich	0.926***	0.698***	0.882***	0.665***	0.493**	0.630**	0.488**	0.635**	0.800**	0.6667***	0.848***	0.674***
	(0.104)	(0.116)	(0.106)	(0.118)	(0.222)	(0.300)	(0.222)	(0.300)	(0.097)	(0.114)	(0.100)	(0.116)
Location (Rural)												
Urban	-0.017	-0.008	-0.026	-0.011	0.125	-0.135	0.151	-0.113	0.060	0.005	0.025	-0.005
	(0.085)	(0.107)	(0.086)	(0.107)	(0.198)	(0.279)	(0.196)	(0.277)	(0.082)	(0.109)	(0.082)	(0.110)
Religion (Autres religions)												
Christian	0.193*	-0.024	0.172	-0.042	0.327	-0.302	0.320	-0.295	0.250**	-0.025	0.262	-0.018

(0.116)	(0.115)	(0.117)	(0.116)	(0.365)	(0.380)	(0.372)	(0.382)	(0.112)	(0.110)	(0.112)	(0.110)
Muslim											
-0.266*	-0.942***	-0.247*	-0.925***	0.037	-0.541	0.030	-0.516	-0.243*	-0.894***	-0.232	-0.888***
(0.139)	(0.167)	(0.140)	(0.170)	(0.433)	(0.489)	(0.440)	(0.491)	(0.134)	(0.156)	(0.132)	(0.157)
Regionsdummies YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Constant -2.787***	-4.103***	-2.905***	-4.342***	-3.173 **	-2.217**	-3.257***	-2.410**	-1.709***	-3.305***	-2.054***	-3.347
(0.368)	(0.431)	(0.374)	(0.439)	(0.924)	(0.924)	(0.945)	(1.127)	(0.312)	(0.393)	(0.318)	(0.390)
Observations 9,805		9805		1155		1155		10960		10960	
Wald 1025.96		1051.62		173.90		178.73		1208.40		1228.96	
Prob> chi2 0.000		0.000		0.000		0.000		0.000		0.000	

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
The reference:Do not use contraception

Table 6. Multinomial Probit estimations of the contraceptive choice (marginal effects)

	Women in union		Women not in union but sexually active		The whole	
Reference: Do not use contraception	**Modern method**	**Traditional method**	**Modern method**	**Traditional method**	**Modern method**	**Traditional method**
Female education (Ref. No education)						
Primary	0.034**	0.021**	0.369***	-0.028	0.076***	0.036***
	(0.016)	(0.010)	(0.00)	(0.073)	(0.016)	(0.011)
Secondary	0.091***	0.038***	0.492***	0.024	0.168***	0.060***
	(0.091)	(0.012)	(0.104)	(0.070)	(0.019)	(0.013)
Superior	0.146***	0.047**	0.474***	-0.023	0.282***	0.070***
	(0.036)	(0.022)	(0.000)	(0.071)	(0.035)	(0.024)
Partner education	YES	YES	YES	YES	YES	YES
Other covariates	YES	YES	YES	YES	YES	YES
Observations	9805		1155		10960	
Probability (predicted)	0.124	0.033	0.465	0.097	0.155	0.043

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

5. Conclusion

This paper aimed to analyze the association between female education and the contraception choice using data from the most recent Demographic and Health Survey combined with Multiple Indicator Clusters (DHS-MICS) conducted in Cameroon in 2011. Econometric results from multiple Probit estimations showed that female education is strongly associated with the contraception choice of women and that educated women are more oriented towards modern contraception methods than traditional methods even if the use of both types of methods improves with female education. This result is robust when we consider only women in union or only women not in union but sexually active. For women not in union, but sexually active, female education attainment starts to be significantly associated with the traditional contraception choice at the secondary education level. These results show that, female health pathways and fertility dynamics in Cameroon can be improved by encouraging education of young girls to further their studies till secondary education level.

Though this result is important for developing countries such as Cameroon, this study has some limits that would be useful to be overcome if the causal effect of education on the contraceptive choice needs to be known, because a strongly association between education and contraception behaviors does not necessarily reflects a causal effect of education on the contraception method choice. This association could also be the fact of third factors that influence both education and modern contraception methods such as cognitive ability or time preferences.

In this case, data which authorized an exogenous variation of female education must be looked for to find a causal effect of education on the contraceptive behavior in developing countries like Cameroon.

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