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Classification JEL: *I12, I30*

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Gbangoula Seremandji Alain Hyacinthe [α] & Christian Zamo Akono [σ]

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I. Introduction

Millions of women in developing countries experience life-threatening health problems related to pregnancy or childbirth. The demand for prenatal health care is what economists call the production of health. It has theoretical explanations in the approach of Andersen (1968) Grossman (1972) Evans (1974). In research on the factors that explain the demand for health care, Andersen (1968a, 1995b) and Andersen and Newman, (1973a, 1995b) show that the use of health services depends on predisposing factors, including women's education, facilitating or inhibiting factors, and a perceived need to improve health. For Grossman (1972) 'good health' is a commodity produced by the individual which is considered to be part of their human capital. This approach is used to explain the investments that pregnant women make during pregnancy. Grossman explains that health capital, which depreciates with age, can be maintained and even appreciated by combining, in a process of transformation from medical to health care, the stock of education and the time available. The induced demand theory of Evans (1974) explains that the patient-consumer of medical care is unaware of the characteristics of the good to be consumed, which is the treatment during pregnancy.

Complications of pregnancy and childbirth cause more deaths than any other reproductive health problem. The World Health Organization (WHO) estimates that 600,000 women of childbearing age die each year from pregnancy-related complications, with a high proportion of these deaths occurring in sub-Saharan Africa averaging 546 per 100,000 live births (WHO, 2018). Over the past few decades, measures to reduce maternal mortality have been implemented in many countries. In addition to these measures, we are seeing an increase in initiatives related to maternal and child health. Among these initiatives are the Millennium Development Goals, whose goals 4 and 5 were to reduce maternal and child mortality by two-thirds by 2015 (Tabutin and Masquelier 2017). These initiatives have certainly reduced global under-five mortality by more than 50%. This decline has accelerated since 2015, to 3.8% per year, compared to 2% in the 2000s. Unfortunately, this progress masks disparities in the demand for antenatal care in some African countries, including the Central African Republic. Yet the antenatal period offers important opportunities for the care and well-being of pregnant women and their infants. It allows for a better understanding of the growth and development of the fetus and its relationship to the health of the mother (WHO, 2019).

For Beldjerd et al (2021), pregnancy is an event in a woman's life that requires special medical monitoring. Indeed, for a pregnant woman, it is important to check that she is in good health. To this end, how should prenatal consultations take place during the nine months of pregnancy? Prenatal consultations are a series of examinations that a woman must undergo during her pregnancy either by a qualified person (midwife, gynaecologist, nurse, etc.). WHO, (2017) recommends in fact, eight mandatory examinations to be carried out. During pregnancy, the first one should take place between 2e and 3e months. It consists of ascertaining the pregnancy and determining the medical follow-up with the health care staff. However, the rest of the visits will be used to check the development of the foetus through ultrasound scans, blood tests, blood pressure tests and urine tests. The second visit takes place in the 4e month of pregnancy. It consists of a screening for trisomy 21 and to see if the pregnancy presents a risk or not[1]. The

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[1] The health care staff check the development of the foetus and carry out a cervical and oral examination throughout the pregnancy. The third prenatal visit takes place at 5e months of pregnancy. This is an important examination date for any pregnancy as the second ultrasound will reveal the sex of the child. A new urine test may be performed to check that the kidneys are functioning normally. The 6e month check-up is to see if the pregnant woman has tested positive for hepatitis B and is also the time to put your feet up. The 5e prenatal visit

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examinations in the 9e month of pregnancy check the position to determine the conditions of the delivery (vaginal or caesarean) and the pregnancy an aesthesia consultation and propose an epidural if necessary. In developing countries such as CAR, just over half of pregnant women have received the eight visits recommended by the World Health Organisation. For example, the 2010 MICS survey shows that only 18% of pregnant women were registered for antenatal care in their first trimester, 56% in their second trimester and 26% in their third trimester. The CAR MICS Multiple Indicator Cluster Survey, (2019) also reveals a similar result, namely that only 22% of all women surveyed were registered for antenatal care in their first trimester and only 34% of all deliveries are attended by health professionals.

At the national level, according to the 2016 National Health Development Plan (PNDS), antenatal care coverage is higher in urban areas. And only 68% of pregnant women in urban areas received antenatal care at least once during their pregnancy by qualified personnel compared to 57% in rural areas. In the prefectures, the highest level of this indicator (use of antenatal care) is observed in Bangui 91% due to the greater concentration of health personnel, while the lowest level is found in Basse-Kotto [2] 43%. Antenatal care is more often provided by paramedical staff 63% than by doctors 6%. Among the reasons for this low use of care during pregnancy we have the level of education of the mothers. The higher the educational level of the woman, the more she aspires to a higher income and the more she uses the services of qualified personnel during prenatal care. However, 54% of pregnant women with no education seek antenatal care services from qualified personnel, compared to 73% of pregnant women with primary education and 93% of pregnant women with secondary education or higher. It is important to note that the possible mechanisms of the relationship between education and health raise the question and require a clear understanding of the reasons for not using health care during pregnancy.

The issue of health in general and maternal health in particular is of interest to many authors, hence the existence of numerous research papers, articles and books on health issues around the world. Researchers continue to pay attention and point to the level of education as one of the factors that can explain the demand for prenatal health care. According to these studies, there is generally a positive relationship between maternal education and women's education, particularly with regard to the use of health care (Caldwell, 1981; Elo 1992; Yang et al 2010; Anita Anima Daniels 2013; Daniels 2013; Menda, 2020). Caldwell (1981) confirms this relationship and argues that education produces changes in a woman's values, attitudes and behaviour. It gives women greater decision-making power in the household and in their communities, resulting in an increased demand for preventive care. Educating women and girls will help achieve other goals such as food security and nutrition, maternal and child health, and the prevention and treatment of communicable diseases. Elo (1992) The study shows that an educated mother is more likely to be aware of the need for antenatal visits or assistance by trained health personnel. The author also highlights the importance of the spouse's level of education. According to him, the spouse's level of education is equally important in the decision to use maternal health care, although it seems to have less influence than women. Daniels (2013) works on factors influencing maternal health utilisation among rural women in Ghana. He finds that respondents' level of education was not significantly associated with all maternal health outcomes. In Indonesia, Efendi, et al (2017) analyze factors influencing maternal health care service use with data from the 2012 Demographic and Health Survey. They conclude on the link between the education gap of spouses, and show that the likelihood of using maternal health care increases when husbands have a higher education level than their wives. Wives whose husbands were better educated were almost twice as likely to receive all three maternal care interventions as those whose husbands had the same or lower levels of education. According to a study by Menda, (2020), each additional year of education in a girl's life reduces the risk of her unborn baby dying by 10%.

The non-optimal use of antenatal care remains a significant public health problem given the high maternal and neonatal mortality rates in the country. Access to maternal health care in CAR remains restrictive despite major efforts to create, build and equip health facilities and the existence of a national health technology strategy document. Indeed, a significant proportion of the Central African population does not have access to essential health care, either because adequate services are not available, or because these services are not affordable for the poorest. This situation is attributable to several constraints that limit access to health care, thereby increasing maternal mortality. Utilization of maternal

takes place in the 7e month of pregnancy. This is a routine pregnancy check-up to ensure that the pregnancy is going well and to start preparing for the birth. The consultation in the 8e month of pregnancy is the last ultrasound. This will check the growth of the foetus, the proper functioning of all organs and its positioning in preparation for the birth.

[2] Basse-Kotto is one of the prefectures in the south-east of CAR. It should be noted that the relatively high rate of antenatal care coverage in the prefectures of Nana-Grébizi (79%) and Haut-Mbomou (76%) in a conflict or post-conflict situation is due to the actions of humanitarians (United Nations agencies and international NGOs), whose interventions have improved physical and financial access (free of charge) to health care services and the availability of basic care.

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health services is a complex phenomenon and is influenced by several factors. The factors affecting the use of these services must therefore be clearly understood. For this reason, we set out to analyse the effects of maternal education on the demand for antenatal care. If the level of education is a fundamental element of the demand for care, it is important to ask the question: How does the mother's level of education influence the demand for prenatal care in the Central African Republic? The remainder of the paper is composed as follows. In the section following the introduction, we present the data and the method used, followed by the results and discussion in section 3. Section 4 is reserved for the conclusion.

II. Methods and Data

In this section, we present the econometric estimation method and the data used followed by the definition of the variables.

a) Theoretical model

The study of health care seeking behaviour has, for the most part, been approached through the prism of theoretical behavioural modelling which emphasises the health rationality of the patient. The theoretical model often used to explain health care seeking behaviour is the "Behavioural model" developed by Anderson. The paradigm proposed by Anderson provides an understanding of individual factors in health care seeking by developing a model that integrates three groups of factors, namely predisposing factors, enabling factors and needs (Anderson, 1968). According to Anderson (1968), individuals face a health problem in different ways. Their responses depend on so-called predisposing factors which may be derived from demographic characteristics (age, gender), social structure or belief. For example, beliefs may encourage early demand for maternal health care if women believe that formal demand can help to heal. However, these predisposing factors alone are not sufficient to trigger a demand for antenatal care, but rather the resources must be available, i.e. the enabling factors. Based on this seminal model, two theoretical models were developed, first Anderson and Newman (1973) and then Kroeger (1983), to improve relevance by taking into account other variables. For Anderson and Newman (1973), in addition to the three factors of the demand for care, societal determinants such as technology and norms as well as the care system must be integrated. Kroeger (1983) develops a theoretical model for developing countries. The author shows that the decision to seek care varies not only according to individual characteristics and the level of health facilities but also according to social, cultural and historical contexts. In this paper, we use Kroeger's (1983) theoretical model to analyse maternal health care seeking behaviour in the context of developing countries such as the Central African Republic.

b) Empirical model

The econometric model in this paper is based on the theoretical model of Kroeger (1983) to estimate the maternal health care use behaviour of educated women. We use the ordered multinomial logit to estimate the production function of child health. The empirical model estimated in this work is formalised as follows:

$$H_i = \alpha + \beta\, predisp_i + \gamma\, facili_i + \phi besoin_i + \varepsilon_i$$

Where H_i is the dependent variable that measures the number of visits made by the mother during pregnancy.

$$H_i = \begin{cases} 0 \text{ if she does no visite} \\ 1 \text{ if she does less than four visites} \\ 2 \text{ if she does all the eight visites} \end{cases}$$

α is the constant term β is a $k \times 1$; predisp, represents in our work the variables that predispose the demand for prenatal health care (level of education, age, sex of the head of household, marital status and religion) and $facili_i$ represents the vector of factors facilitating the use of care during pregnancy (standard of living, area of residence, number of people in the household and distance to a health centre) and besoin, which takes into account the factors of need for care during pregnancy (morbid state of the mother etc.); u is the error term. The nature of our dependent variable leads us to use an ordered multinomial logit since H_i is categorical J ($J \geq 3$) mutually exclusive ordered categories.

Let $V_{ij} = \Pr\ (\ H_i = j / X_i\ )$, $j = 1, 2, ..., J$ denote the conditional probability that the randomly selected i^{th} mother with factors is in the jth response category. X_i is a p-dimensional vector of predisposing, facilitating and maternal health care needs variables. Let P_{ij} be the corresponding cumulative probability that the ith pregnant women belong to less than equal to the jth response category with the dependent variables X_i .

$$P_{ij} = \Pr(Y_i \leq j / X_i) = V_{i1}(X_i) + V_{i2}(X_i) + .\ +.V_{ij}(X_i)$$
$$i = 1, 2, ..., n \text{ and } j = 1, 2, ..., J$$

The link function is used to transform the cumulative probabilities into a linear function of independent variables. In other words, the link function is used to maintain a linear relationship between the coefficients and parameters on the right-hand side of

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the equation and the dependent transformed by the link function on the left-hand side of the equation.

Let $f(.)$ be the logit link function, then the logistic model of the proportion scores would be:

$$f(P_{ij}) = \log\left[\frac{P_{ij}}{1-P_{ij}}\right] = \theta_j - X_i^t\beta$$

Here, only θ_j varies on the $j-1$ multinomial logit, the value of the regression coefficients remains identical for each equation. The maximum likelihood method is used to estimate the parameters.

Assume that the probabilities of ith woman in J response categories Y_i in the presence of X_i independent variables are: $V_{i1}(X_i)$ $V_{i1}(X_i)$ ....., $V_{iJ}(X_i)$.

$$\Pr(Y_i \le j / X_i) = \frac{\exp(\theta_j - X_i^t\beta)}{1+\exp(\theta_j - X_i^t\beta)}$$

The derivation of this model is generally attributed to Walker and Ducan (1967) and McChullagh (1980) who called this model the "proportional odds model".

c) Source of data

The data used for this study come from the Central African Republic (CAR) Multiple Indicator Cluster Survey (MICS) conducted in 2010 by the Institut Centrafricain des Statistiques et des Études Économiques et Sociales (ICASEES) with financial and technical support from the United Nations Children's Fund (UNICEF), the United Nations Population Fund (UNFPA). The sample for the fourth MICS4 survey in the Central African Republic was designed to provide estimates for a large number of indicators on the situation of children and women at the national level, by place of residence, and for all 16 prefectures of the country covered by the survey. In the households surveyed, 12507 women (aged 15-49) were identified. In our study, we are particularly interested in women and children. Women who had made at least one prenatal visit.

i. *Definition and measurement of variables*

- Dependent variable

In this work we seek to see whether or not a pregnant woman has received care as recommended by the WHO. Antenatal care (ANC) is provided to enable healthy motherhood through early detection of risk factors and to intervene in a timely manner if necessary. Information on ANC coverage was obtained from women who had given birth in the two years preceding the survey. For women who had two or more live births in the two-year period, the data refer to the most recent birth only. The dependent variable is prenatal consultation during pregnancy. This variable is discrete and we will make them polysemous has more than two modalities which will take the value 1 if the woman did not make any visits during pregnancy, 2 if she made less than four antenatal visits and 3 if she made the eight visits as recommended by the World Health Organization (WHO, 2006, Mohammad et al, 2017). The selected indicators of maternal health care utilization and their components are based on the guidelines developed by the World Health Organization (WHO 2006). The independent variables, on the other hand, can be of any nature: categorical or quantitative.

- Independent variables

The explanatory variables in this work are divided into three categories based on Anderson's (1968) conceptual framework of care-seeking, according to which care-seeking during pregnancy is a function of three factors, namely: predisposing factors and facilitating factors and the need factor. The predisposing factors used include the mother's level of education, her age during pregnancy, the sex of the head of the household and the ethnicity of the head of the household, marital status and religion of the head of the household.

The mother's education refers to the level of education achieved by the individual at each period. The level of education plays a fundamental role in explaining women's behaviour in society. The lower the educational level of the woman, the lower or non-existent the use of modern health care. In the context of this study, this variable takes three forms: no level, primary level and secondary level or higher. The choice of this variable is based on studies such as that of Wan and Arling (1983) who find that women with a high level of education are more likely to seek antenatal care. Thus, access to maternal health services increases with a woman's level of education. Therefore, lack of education is a barrier to pregnancy management and continuity of antenatal care. Out of 2909 pregnant women who made at least one visit during their pregnancy, only 10.69% had secondary school education or higher, compared to 44.33% who had primary school education and 44.98% who had no education. These percentages explain that the level of education is still a concern for the demand for maternal health care.

Studies have shown that the use of care is dependent on the age of the mother. Por et al (2008) find that older women have a high demand for antenatal care, probably because they have had more deliveries and have a medical history during previous deliveries. The variable age of the mother during pregnancy is an indicator of the demand for maternal health care. In this work, the age of the mother concerned is those aged

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15-49 and has seven modalities: 15-19, 20-24, 25-29, 30-34, 35-39, 40-44, and 45-49.

Previous work has shown that marital status affects the use of maternal health services during pregnancy and childbirth. Unmarried women rarely have the resources to access modern care, as they tend to have less adequate antenatal care than other women due to the unwanted nature of the pregnancy and are therefore less likely to make an antenatal visit. In contrast, married women make more visits, especially as they have financial support from their spouses for ongoing obstetric care. According to our database, 78.14% of mothers are unmarried and the majority are adolescents aged 15-19 and 20-24 years. This may have influenced the use of antenatal care, as adolescents may lack independence and power to make decisions and may be forced to accept decisions made on their behalf. In this article, this variable takes three forms, single, common-law and married. Hence the choice of this variable to explain the demand for care during pregnancy.

Religion also has a significant influence on access to maternal health care. Indeed, certain religious practices are directly linked to social life: clothing, food, use of modern health care. In CAR, there are three main religions: Catholicism, Christianity and Islam, which are generally associated with a variety of perceptions of the use of modern health care. This results in a set of traditional health system practices specific to each religion. Therefore, the management of pregnancy and childbirth is likely to be influenced by religious affiliation. Our analyses show that almost 30.42% of women living in Catholic households and 56.66% of Protestants have regular access to health care. On the other hand, we note only 10.92% of Muslim women and 1.30% of other religions (Mics, 2010). In our work this variable takes four modalities 1 if the head of the household is Catholic, 2 if she is Christian and 3 if she belongs to a Muslim religion and 4 others.

According to Anderson's (1969) theoretical model, the factors that facilitate the demand for maternal health care are standard of living, place of residence, distance to the nearest health facility and household size. The standard of living of the household plays a fundamental role in the demand for care during pregnancy. For Bass and Noelker (1987), families with a low standard of living are more likely to use home care than those with a high standard of living. Standard of living is defined as the total assets owned by the household. This variable has three modalities: 1 if the household is poor, 2 if the household has an average standard of living and 3 if it is rich.

Studies have shown that women from urban and rural areas have different perceptions of health service use. To account for the influence of the woman's childhood environment, we included the woman's reported place of residence in childhood as a categorical explanatory variable. Place of residence has a significant impact on access to health care. Living in a rural area has a negative impact on the use of health care, since health facilities in rural areas are under-equipped in terms of equipment and health personnel. In CAR, 67.52% of women live in rural areas compared to 32.48% in urban areas. This facilitating variable takes the value 1 if the woman lives in the rural area and 0 otherwise.

Access to health care is found to decrease with increasing household size. This means that if a household's income is distributed equally among household members, those from large households are relatively disadvantaged compared to those from small households, regardless of the socio-economic status of the household. This variable is quantitative.

Among the factors facilitating the use of care we have the distance to a public facility or distance to the nearest health facility. It represents the supply of care during pregnancy. Previous work on the effect of distance on the use of health services shows a decrease in utilisation rates with increasing distance. The distance between a pregnant woman's home and the health centre is important for access to maternal health care. It was found that women living less than 5 km away were more likely than those living more than 5 km away to use the services.

The variables selected above are derived from the conceptual framework of the Anderson (1968) model. We have written three methods of analysis namely: univariate descriptive statistics as well as an econometric analysis by an ordered multinomial logit model to estimate our model. The statistical analysis and estimations will be done by Stata 14 software.

III. Results and Discussion

To achieve the objectives set out in this article, we used two approaches. The descriptive approach allows us to characterize the variables, based on the frequencies (in %) and to evaluate the influence of the mother's level of education on the probability of making the eight prenatal visits, we used the ordered multinomial log it regression model.

a) Descriptive statistics

The results in the table below show the characteristics of the variables (central tendency, dispersion). The analysis of our dependent variable which is the number of times a woman has made the prenatal consultation shows that out of 10497 women 2.909 responded that they had made at least one visit during pregnancy.

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Table 1: Descriptive statistics

Variable	Mean	Std. Dev.	Min	Max
Prenatalcare				
No	0.0006875	.0262161	0	1
Inadequate	0.5149536	.4998623	0	1
Adequate	0.4843589	.4998412	0	1
Education of the mother				
No	0.4499116	.4975107	0	1
Primary	0.4431499	.4967834	0	1
Secondary	0.1069385	.3090511	0	1
Age of the mother during pregnancy				
15-19	0.2047228	.4035199	0	1
20-24	0.2122126	.4088959	0	1
25-29	0.1835015	.3870973	0	1
30-34	0.1308645	.3372696	0	1
35-39	0.1099553	.3128503	0	1
40-44	0.0880058	.2833181	0	1
45-49	0.0707375	.2563993	0	1
Gender of the head of the household				
Male	0.7908715	.4067063	0	1
Female	0.2091285	.4067063	0	1
Ethnicity of the head of the household				
Haoussa	0.0502656	.2185032	0	1
Sara	0.0478064	.2133669	0	1
Mboum	0.0437734	.2046005	0	1
Gbaya	0.2456227	.4304769	0	1
Mandja	0.1066299	.3086574	0	1
Banda	0.2840842	.4509993	0	1
Ngbaka-Bantou	0.0667913	.2496724	0	1
Yakoma-Sango	0.0405272	.197202	0	1
Zande/Nzakara	0.0493803	.2166714	0	1
Marital status				
Single	0.7815458	.4132187	0	1
Free union	0.1189015	.3236894	0	1
marry	0.0995527	.2994182	0	1
Religion of the head of the household				
Catholic	0.3046429	.4602787	0	1
Protestant	0.5668896	.4955299	0	1
Muslimwoman	0.1094826	.3122591	0	1
Other	0.0189849	.1364781	0	1
Number of persons in the household				
	4.565021	2.69653	1	28
Household standard of living				
poor	0.2217387	.4154363	0	1
Medium	0.4883474	.4998884	0	1
Rich	0.2899139	.4537442	0	1
Place of residence				
Urban	0.3246301	.4682591	0	1
Rural	0.6753699	.4682591	0	1
Media Access				
No	0.4028133	.4904879	0	1
Yes	0.5971867	.4904879	0	1
Distance to Heathpost				
Lessthan 1 km	0.3614007	.48043	0	1
1 to 5 km	0.3864844	.4869677	0	1
6 à 95	0.2521149	.4342482	0	1
N= 2,909				

Source: Author, using 2010 MICS data, CAR

The descriptive results show that women who did not make the prenatal visit represent 0.06%, those who made less than four visits represent 51.49% and those who made more than four visits are 48.43%. In

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Mics 2010, information on educational level was collected for women aged 15-49 years. About 45% of women had no education, 44.31% had primary education, 11% had secondary or higher education. The age at which childbearing begins has important consequences for the overall level of fertility and for the health and well-being of the mother and child. As indicated in the descriptive analysis (see table above), early pregnancy is common in CAR, with the majority of women becoming mothers after the age of 15. Approximately 20.47% of women aged 15-19, 21.22% of women aged 20-24 and over and 11% of women under 20 had given birth to their first child before the age of 15. The average age at first birth for women aged 15-49 is 28 years. Marriage is one of the main indications of women's exposure to the possibility of pregnancy and is therefore important for understanding fertility. Early age at first marriage in a population is generally associated with a longer period of exposure to the risk of pregnancy and thus with higher levels of fertility. The early initiation of childbearing associated with early marriage can also be detrimental to the health of women and children. compared to the 2002 EDHS, which was 23%. In this study, the Mics report (2010) currently married women represent 9.95%, single women 78.15% and women in common-law relationships represent 11.89%. The average distance to a health centre is 5 km.

b) Interpretation and Discussion

Good women's health in the world generally depends first and foremost on the care of women, and in particular women in pregnancy through to childbirth. However, in most developing countries, these ordeals are still fatal for some women who lose their lives in the process. Indeed, this is due to the fact that access to maternal health care is becoming constrained despite the improvement seen in some developing regions (WHO, 2018). We aim to identify the link between the mother's level of education and the likelihood of making at least one visit during pregnancy as recommended by the WHO in the Central African context. In other words, we seek to see if the number of visits during the nine months of pregnancy can be explained by the mother's level of education. The variable number of visits during pregnancy, which is 1 if she made no visits, 2 if she made less than four visits and 3 if she made all eight visits. The results of this article show that women do not systematically benefit from follow-up during their pregnancy or assistance at the time of delivery because of various barriers that limit access to health care. Considering the predisposing variables among which the mother's level of education, we observed that mothers with primary, secondary and higher levels of education are more likely to have a full antenatal consultation.

Table 2: Multinomial ordered logit model estimation

Variable	Model 1	Model 2	Model 3
Level of education			
No level	ref	ref	ref
Primary	0.165**(0.0794)	0.208**(0.0821)	0.804***(0.240)
Secondary or higher	0.915***(0.134)	0.975***(0.138)	2.146***(0.473)
Age of the mother			
15-19		ref	ref
20-24		-0.0360(0.113)	-0.0347(0.114)
25-29		0.173(0.118)	0.185(0.119)
30-34		0.130(0.136)	0.131(0.137)
35-39		0.351**(0.153)	0.360**(0.154)
40-44		-0.0769(0.221)	-0.0837(0.222)
45-49		0.394(0.476)	0.414(0.479)
Gender of the head of the household			
male		ref	
Female		-0.0298(0.0929)	-0.0516(0.0965)
Ethnicity of the head of the household			
Haoussa		ref	
Sara		-0.292(0.282)	-0.287(0.283)
Mboum		0.135(0.309)	0.166(0.310)
Gbaya		-0.261(0.266)	-0.281(0.267)
Mandja		-0.265(0.283)	-0.270(0.285)
Banda		-0.323(0.266)	-0.351(0.267)
Ngbaka-Bantou		-0.185(0.290)	-0.162(0.291)
Yakoma-Sango		-0.835**(0.331)	-0.898***(0.335)
Zande/Nzakara		-0.919***(0.312)	-0.954***(0.317)
Other local ethnic groups		-0.400(0.294)	-0.385(0.295)

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Other ethnic groups		-0.333(0.348)	-0.336(0.350)
Marital status			
single		ref	ref
Free union		-0.277*(0.146)	-0.288**(0.146)
Married		0.426*(0.244)	0.436*(0.244)
Religion of the head of the household			
Catholic		ref	ref
Protestant		0.102(0.0866)	0.0991(0.0870)
Muslim woman		-0.333*(0.198)	-0.293(0.199)
Other		0.145(0.266)	0.133(0.268)
Standard of living			
Poor			ref
Medium			-0.0473(0.0972)
rich			0.0498(0.121)
Workforce			0.00785(0.0145)
Place of residence			
Urban			ref
Rural			0.229*(0.134)
Access to the media			
not			ref
Yes			0.165**(0.0820)
Distance			
Less than 1 km			Ref
1 to 5 km			0.0512(0.0886)
6 à 90			0.266***(0.102)
Interaction			-0.350***(0.133)
/cut1	-7.130***(0.709)	-7.217***(0.782)	-6.999***(0.778)
/cut2	0.241***(0.0596)	0.201(0.335)	0.423(0.327)
Comments	2,909	2,875	2,875

Source: Analysis of MICS data, 2010

Model 1 is globally significant and the chi-square of the model is 49.19 which is highly significant and tells us that the variable level of education of the mother has a significant effect of 5% and 1% respectively according to the primary and secondary level and more on the number of prenatal visits. Model 2 is also significant with a chi-square of 106.10 which means that the predisposing variables strongly affect the number of prenatal visits. The third estimate is significant with a chi-square that increases from 126.14 to 33 degrees of freedom. From model 1, it is clear that there is a highly significant unadjusted association between maternal education and complete prenatal visits. The coefficients of the education variable are 0.165 and 0.915 at 5% and 1% respectively for primary, secondary and higher education. These results show that a woman's attainment of primary, secondary and higher education gives her a 16.5% and 91% probability respectively of making all eight visits during pregnancy compared to uneducated women. In other words, mothers with primary and secondary education are 20.8% and 97.5% less likely to have full antenatal visits, respectively, than mothers with no education. The results of the ordered multinomial logit model analysis with all factors of care demand according to the theoretical framework of Anderson (1968) and Anderson and Newman (1973) showed that mother's education level, mother's age, mother's marital status and media exposure are related to the use of antenatal care (Table 4 above) The results further showed that antenatal coverage is highest among the most educated women. For example, 80% of primary school mothers use antenatal care. The mother's secondary education level is significant at a threshold of 1%. We can see that the mother's education has a positive effect on the use of care during pregnancy. In other words, an additional year increases the probability of making all visits by a factor of 2.14 (WHO, 2015).

Some of the results show that an improvement in these indicators is even greater for women with secondary education. In Peru, a study by Elo (1992) found similar results to ours but comparing maternal and paternal education on child health. According to this study, maternal education on child survival was on average twice as important as paternal education. Anima D (2013) who finds that maternal education is inversely related to the risk of her child dying. Although the relationship is not linear, children born to

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uneducated mothers suffer the highest mortality at all ages. Brixiova et al (49) report that the infant mortality rate of children whose mothers have primary education is 25% lower than that of children whose mothers have no education. The gap between children of mothers with at least secondary education and children of mothers with no education is 36%. About 60 percent of women with at least secondary education are able to read dosages and remember the date of appointments, compared to 90 percent of women with no education. A woman with secondary or higher education is twice as likely to receive antenatal care from a doctor as a woman without education (Mics, 2019). The finding of a strong effect of education is consistent with findings elsewhere in the world Pelto G (1987) Becker S, Peters D, Gray R, Gultiano C, Black R (1993) Celik Y, D Hotchkiss (2000). There are a number of explanations for why education is a key determinant of health service utilisation. Education is likely to improve women's autonomy so that women develop greater confidence and ability to make decisions about their own health Caldwell J (1981) Raghupathy (1996) Akin A, Munevver B (1996). It is also likely that educated women seek better quality services and have a greater ability to use health inputs that provide better care. Interestingly, some results from indicated that respondents' level of education was not significantly associated with all maternal health outcomes. On the other hand, contrary to ideas that maternal education has a linear effect on care, Kone (2012) shows that when the mother is educated, she tends to self-medicate rather than use a health facility. Undoubtedly, these findings stem at least in part from the fact that women are primarily responsible for their own and their child's health and therefore their attitudes and skills are particularly important with regard to antenatal care. Similarly, Audibert et al (1998) in Côte d'Ivoire do not find statistically significant links between level of education and the number of children born to women. If educated mothers consider that they are sufficiently informed, then given their time constraint, it is understandable that they tend to bypass health care facilities by going directly to the pharmacy or using the family pharmacy to treat themselves (Habtom, 2017). This result could be due to the fact that most of the interviewees had some knowledge of the antenatal care, regardless of their level of education. This suggests that knowledge about the antenatal care is not related to formal education. Thus, people could be educated through informal means such as radio among others.

Most of the factors studied are related to women's predisposing factors to seeking antenatal care. The study identified several factors that have a significant influence on the use of maternal health services in CAR. These include maternal age. The results of the estimation of model 2 as a whole reinforce the importance of maternal age as the second most important determinant of antenatal care utilisation. Women who were between 35 and 39 years of age were 35.1% more likely to receive antenatal care. Analysis of the results of model 3 according to the mother's age during pregnancy shows that being between 35 and 39 years old positively influences the chance of using antenatal care. That is, mothers aged between 20 and 24 have a 36% chance of making more visits during pregnancy. Among the factors that positively and significantly influence the number of visits during pregnancy, we have the marital status of the mother. That is, when the pregnant woman is married, the probability of making the prenatal visit is 42.6%. In other words, married pregnant women are 42.6% more likely to seek care during pregnancy. However, belonging to a Yakoma/Sango and Zande/Nzakara ethnic group reduces the chance of attending antenatal visits during pregnancy by 83% and 91.9% respectively. In addition, when the woman is in a common-law union, the number of visits during pregnancy is negatively affected by 27.7%. In model 3, belonging to the Yakoma/Sango and Zande/Nzakara ethnic groups reduces the chance of making all eight antenatal visits. Married women are 43.6% more likely to receive antenatal care from a health professional than single women. The practice of Muslim religion negatively and significantly influences the chance of making all visits during pregnancy i.e. a woman with a Muslim husband has a 33.3% probability of making all prenatal visits. However, the interaction between level of education and area of residence negatively affects the demand for care during pregnancy. In other words, being educated and living in a rural area negatively influences the amount of care during pregnancy.

In the Central African Republic, religion has a strong influence on women's access to health care. This result is similar to that of Beninguisse (2001), who links the use of health services with social institutions such as religion and thus allows us to understand women's behaviour towards the health care system during different maternity-related events. Regional variations in access to health services are significant in CAR. Women living in rural areas are unlikely to visit health facilities during pregnancy. A higher proportion of women living in rural areas receive less antenatal care and give birth at home. As a result, maternal mortality and child malnutrition are higher in rural than in urban areas. In addition, 80% of health professionals are in the urban area. Thus, the reason for the high level of maternal health service utilisation among urban women compared to their rural counterparts is easy to understand. As in most sub-Saharan countries, rural women do not have greater knowledge and access to maternal health services than their urban counterparts. This is because health facilities are more accessible in urban areas and the various health promotion programmes that use urban-oriented mass media work

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to the advantage of urban residents and explain the strong link between urban residence and maternal health service use. In addition, rural women are more easily influenced by traditional practices that are contrary to modern health care. Furthermore, women in common-law relationships may have a lower chance of seeking care than married women. We consider married women to be those who make alliances with their spouse. Our results allow us to conclude that married women are more likely to seek prenatal care than those living in a common-law relationship and not married. This was confirmed by Trop (2008) in his work on the knowledge, attitudes and practices of women on malaria in the rural area of Poponguine, Senegal. He shows that 92.9% of married women used the health facility compared to 91.2% of unmarried women. This means that married women have a high chance of benefiting from their spouses' help.

Proportionality hypothesis test

- Testing the proportional hypothesis

The strict assumption of this model is proportional probability in the response category. This means that the ordinal regression assumes that the coefficients describing the relationship between less than or equal to the jth category versus greater than the jth category have the same log-odds as those describing the relationship between less than or equal to $(j+1)^{ième}$ response category versus greater than the $(j+1)^{ième}$ categories, etc. The adequacy of the 'proportional odds' assumption in the response category for each covariate as well as combined must be carefully assessed before applying the proportional odds model. There are three methods for testing the overall proportional hypothesis: (i) the likelihood ratio test (ii) the Lagrange multiplier or score test, and (iii) the Wald test.

Brant: Test of parallel regression assumption

	chi2	p>chi2	df
All	**1.94**	**0.983**	**8**
Level of education	0.01	0.914	1
Age of mother	0.69	0.407	1
ethnicity of the head of the household	0.00	0.994	1
Religion of the head of the household	0.58	0.446	1
Household standard of living	0.02	0.875	1
Household size	0.38	0.536	1
Access to the media	0.15	0.703	1
Distance to a health centre	0.31	0.575	1

A significant test statistic provides evidence that the parallel regression assumption has been violated.

Oparallel: Tests of the parallel regression assumption

	Chi2	df	P>Chi2
Wolfe Gould	2.055	8	0.979
Brant	1.941	8	0.983
score	1.958	8	0.982
likelihood ratio	2.07	8	0.979
Wald	1.996	8	0.981

Source: Author

These tests are asymptotically equivalent in large samples and produce the same response. For individual tests, some authors suggest either plotting the log-odds generated by each threshold as a complementary analysis of proportional odds, or applying Brant's (1990) test to test proportional odds for an individual independent variable. The series of tests performed show that the proportionality assumption is not significant on our data indicating that the odds ratios are proportional between categories.

IV. Conclusion and Policy Implications

The aim of this study was to analyse the effects of the mother's education on the demand for maternal health care. Based on Anderson's (1963) conceptual framework of household behaviour as applied to the health of a pregnant woman, the hypothesis of this chapter is that We were able to use Anderson's (1963) conceptual framework of household behaviour applied

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to the health of a pregnant woman to formulate the hypothesis of this chapter, according to which the mother's education has a positive influence on the use of prenatal consultations in the Central African context. The data we used are from the CAR Multiple Indicator Cluster Survey, conducted in 2019. The population concerned consists of 2909 women who were pregnant or had given birth two years before the survey. The results present some expectations regarding the association of variables with the likelihood of seeking care during pregnancy. It appears that predisposing and facilitating factors contribute more to the demand for and access to maternal health care in CAR. CAR has not achieved the Millennium Development Goals 4 and 5 with regard to reducing the maternal mortality rate. The country had a high mortality rate in 2018, making it the third highest in the world in terms of maternal mortality with a rate of about 900 deaths per 100,000 births. This rate is slightly higher than post-neonatal deaths (19 per 1000 live births) during the same period; implying that children are not lucky to survive in CAR. This study shows that the most important factors influencing the use of maternal health services in CAR are predictive and facilitative.

In conclusion, pregnancy in developing countries remains a risk for women. Access to and use of good quality antenatal care undeniably contributes to reducing maternal and infant mortality and morbidity. In CAR, although women are aware of the risks associated with motherhood, for the majority of women the demand for antenatal care remains relatively low. These findings can therefore serve as a basis for a number of policy recommendations. First, the fact that education has a significant impact on the use of maternal health services suggests that improving educational opportunities for women can have a significant impact on improving the use of these services. However, this is a long-term investment. Over the past 10 years, the social benefits of women's education have been observed in CAR. The basic education and gender equality programme has produced good results, particularly in the areas of access and equity in education. Successful approaches, such as supplementary elementary education and plans to make education free, have been able to reach the most remote areas of the country and enrol children (45% of whom are girls) for the first time. The continuation of the adult literacy programme and the inclusion of health education in the curriculum will improve women's use of maternal and child health services. There is scope to accelerate progress in antenatal care services. These services need to be strengthened and coverage of emergency obstetric care expanded. Intensive awareness raising and advocacy campaigns should be undertaken to increase community knowledge and attitudes about the danger signs of pregnancy, childbirth and postnatal and neonatal risks.

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