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Communication:

GEOGRAPHICAL DISPARITIES IN MENSTRUAL HYGIENE MANAGEMENT AMONG YOUNG GIRLS AND ADOLESCENTS AGED 10-24 IN THE HEALTH DISTRICTS OF BOUAKE KORHOGO AND TIEBISSOU (COTE D'IVOIRE)

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1. INTRODUCTION

The issue of menstrual management is one that undermines the debate on women's sexual health on a global scale. According to the World Bank (2015), around 500 million women and girls do not have good menstrual hygiene due to a lack of appropriate sanitary facilities. Although menstruation is a cyclical physiological phenomenon affecting almost all women, from menarche to the menopause, it is still a taboo subject in many parts of the world, especially in Africa. As a result, during menstruation, women and girls are still often considered "dirty" or "impure", which can lead to situations of forced isolation, reduced mobility, dietary restrictions and, above all, poor menstrual hygiene (UNICEF, 2013).According to a study by Neilsen (2010), every year in India, young girls are absent from 20% of school hours because of menstruation; this is the second most common reason for girls being absent from school after housework.

In light of these findings, several initiatives have been undertaken in recent years by development aid institutions to improve the situation. In Ghana, for example, the World Bank has initiated a project to build sanitation facilities and introduce hygiene education courses in more than 260 schools (World Bank, 2018). In Côte d'Ivoire, as elsewhere in sub-Saharan Africa, a number of United Nations agencies, including UNICEF, are working to improve conditions for young women and girls in terms of menstrual hygiene management. This has resulted in the construction and rehabilitation of water points and latrines in 23 schools across the country, giving more than 3,000 pupils access to water and sanitation facilities (UNNICEF, 2019). In addition, the Ivorian government, through its 2012-2015 development plan (PND), is making it easier for households to access water. In terms of access to drinking water, the construction of pumps and water towers and the maintenance of human-powered pumps have significantly increased people's access to improved water sources. The proportion of households with access to an improved water source rose from 78.4% in 2012 to 80.4% in 2016 (EDS 2011-2012; MICS 2016). The same applies to access to improved sanitation facilities, which rose from 21.9% in 2012 to 31.5% in 2016. All these factors should contribute to a beneficial change in menstrual hygiene management among women and girls.

Despite these efforts, the situation continues to give cause for concern, as data from the 2018 performance monitoring for action (PMA) study[1] shows that more than 18% of the girls

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[1] These results were obtained by an exploitation of PMA 2018 data made by the authors.

surveyed missed school because of menstruation. For those who work, 19% were also unable to go to work during their periods. What's more, only 13% of these women had access to a suitable place[2] to manage their periods. And yet several reports indicate the existence of a link between poorly managed menstrual hygiene and urinary or reproductive infection and other diseases (Sarah.H & al, 2012). The question that this study aims to answer is "what are the explanatory factors, depending on the area of residence, for poor menstrual hygiene among young girls and adolescents in the health districts of Bouaké, Korhogo and Tiébissou in Côte d'Ivoire?

Several studies have been carried out on menstrual hygiene in sub-Saharan Africa (Senegal, Niger, Cameroon, Burkina Faso, etc.). However, most of these studies have been limited to descriptive analyses, providing only an overview of the situation, without providing any in-depth explanatory information. The aim of this study is to go beyond the descriptive approach by adding explanatory elements to give a better picture of the scale of the phenomenon.

The aim of this study is to contribute to improving knowledge of the factors that explain poor menstrual hygiene management among young girls and adolescents in the health districts of Bouaké, Korhogo and Tiébissou in Côte d'Ivoire, and to sharpen the strategies and programmes of political decision-makers to improve the health status of young girls and adolescents. More specifically, this involves :

- ✓ Describe the profile of young girls and adolescents with poor menstrual hygiene in both rural and urban areas;
- ✓ Identify explanatory factors linked to poor menstrual hygiene management in both rural and urban areas;

In order to achieve this, this paper first looks at some methodological aspects of the study. It then presents the results of the various analyses, followed by recommendations.

2. Data and methods

The data

This study is based on data from the CAP TRaC survey on menstrual hygiene in young girls and adolescents. The CAP TRaC survey covered 3 health districts in the Ivory Coast (Bouaké,

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[2] It's clean, private, has soap and water and can be locked.

Korhogo and Tiébissou). The survey was carried out in March 2020, reaching 3097 girls and teenagers aged 10-24 in 1872 households.

This database contains information on the characteristics of the households surveyed, menstrual hygiene management behaviour, the use of contraceptive methods and media exposure. In addition to this quantitative component, the CAP TRaC survey had a qualitative component which enabled relevant information to be collected on menstrual management practices in relation to the culture and perceptions of young girls and adolescents in these 3 health districts.

2.1.1   Dependent variable

The dependent variable (explained variable) in this study is "*menstrual hygiene management*". The concept of *menstrual hygiene management* refers to all the strategies implemented by women during menstruation. This variable is an indicator grouping together several indicators. The choice of indicators and criteria used to construct this variable was based both on WSCC (Water Supply and Sanitation Collaborative Council) standards and on the availability of variables in the database. In this way, they are adapted not only to the objectives of the study, but also to the context of Côte d'Ivoire. Summary information on the dimensions, indicators and deprivation criteria is given in the table below.

Table A: Dimensions, indicators and criteria for good **menstrual** *management*

VARIABLE	SELECTED CRITERIA
Protective material most often used during menstruation	The girl or adolescent uses one of the following materials: Disposable sanitary napkin (commercial), Reusable sanitary napkin, Piece of loincloth, cotton, Tampon and toilet paper.
Place to change protective equipment	The girl or adolescent changes her protective equipment in a flush toilet, an improved ventilated latrine, a pit latrine with a slab, a pit latrine without a slab, a composting toilet or in a hanging toilet or latrine and in a sleeping area/room.
Condition of the place where the protective equipment is changed	The girl or teenager changes her protective equipment in a clean, private and safe place that can be locked.
Washing equipment before re-use	The girl or teenager washed the equipment before reusing it in the case of reusable equipment.
Hand washing after changing protective equipment	The girl or teenager washes her hands after changing the protective equipment
Complete drying of equipment before re-use	The girl or teenager dries the material before reuse for reusable material
Disposal of protective equipment	The girl or teenager throws away the protective equipment in the latrine, rubbish bin/bag, burns, equipment not thrown away (for those who use reusable equipment).

Source: Menstrual Hygiene Survey Report, ENSEA 2020

A girl has a "good menstrual hygiene practice" if she obtains a score of 1 for all the variables selected, and a "poor menstrual hygiene practice" if she does not.

2.1.2   Independent (explanatory) variables

- Place of residence

The home environment is the geographical area where the household usually lives. It influences people's behaviour through the cultural, economic and social values specific to each context, as well as through their access to certain services and public goods. For example, the place of residence can influence how young girls and adolescents manage their menstrual periods. Two modalities were used: **urban** and **rural.**

- Household standard of living

It refers to the conditions of well-being in which the household finds itself. A household's standard of living is useful for measuring the ability to mobilise resources to meet the needs of girls and children living in the household. It also provides an indication of the level of comfort of the household in which the girl or adolescent lives. In the present study, we captured this by creating a composite index of asset ownership and housing characteristics as proposed by the DHS-program researchers. The standard of living variable has five categories: **very low, low, medium, high and very high.**

- Department of residence

The health district is defined as a local health system or a sub-system of the overall health system (DIAWARA, 2006). It is the most decentralised or peripheral level of the health system. It is the operational centre of the health system in the sense that it is here that care is produced and delivered to the population. This study is based on three health districts in the Ivory Coast: **Bouaké, Korhogo and Tiébissou**.

- Religion

Religion is a formal system of beliefs, symbols, values and practices to which individuals refer (KONE, 2019). Through the values it conveys, religion influences the perception and behaviour of individuals. In this study, the religion of young girls and adolescents is grouped as follows: **Muslim, Catholic, Evangelical, Other Christian, Other religion/animist and no religion.**

- Type of water source

The type of water source refers to where the household obtains its water. In fact, the nature of the water source reflects its availability in the household. In this study we categorise water sources into two types: **improved and unimproved.**

- Type of toilet source

The type of toilet reflects the state of the sanitary facilities. The availability of adequate sanitary facilities determines how women manage their menstrual hygiene. In this study we categorise the type of toilet into two categories: **improved and unimproved.**

- No one who told her about menstruation

This variable refers to the individual who spoke to the girl about menstruation before puberty. The fact of having heard about menstruation from a reference person can determine the behaviour of young girls in terms of menstrual management. For this variable we have two modalities: **mother, other family members, other people and no one**.

- Level of education

Education makes it easier for girls to embrace new modern values and adopt related behaviours. Educated women would therefore behave more appropriately in terms of menstrual hygiene management. In this study we will recode this variable into 3 modalities, namely: **Never attended school, primary, secondary and higher.**

- Girl's age

A girl's age is a key factor in explaining her social behaviour. As girls grow older, they acquire new behaviours in terms of menstrual management. In this study, we categorised girls' age into 3 categories: 10-14 years, 15-19 years and 20-24 years.

ANALYSIS METHODS

In this study, at the descriptive level, we used bivariate analysis to test the associativity links between the dependent variable and the explanatory variables, and descriptive multivariate analysis, in particular multiple component factor analysis (MCA). The latter was used to establish the profile of young girls and adolescents according to their menstrual hygiene management behaviour. The multivariate analysis was used to measure the net effect of each independent variable on the menstrual hygiene management behaviour of young girls and adolescents. Given the dichotomous nature of our dependent variable, we will use a binary logistic model. Logistic regression will be applied to estimate the probability that a young girl or adolescent will have poor menstrual hygiene.

If p is the probability that the event under study will occur, 1 - p is the probability that the event will not occur, and the logistic regression model can be used to estimate the probability that the event will occur.

$$L = Log \left(\frac{p}{1 - p} \right)$$

In the following linear form : $L = b_0 + b_1X_1 + b_2X_2 + ... + b_pX_p$ $where$ $X_1, X_2, ..., X_p$ are the independent variables and $b_1, b_2, ..., b_p$ are the regression coefficients of the model. A non-linear form is associated with the probability p, as follows:

$$p = \frac{1}{(1 + \exp(-L))}$$

Note that logistic regression uses the maximum likelihood method to estimate the model parameters. Due to the non-linearity of the model, these parameters are estimated by iteration. This method is essentially probabilistic. It provides regression coefficients "b_i" from which Odds Ratios (OR) are calculated (exp(b)). The Odds Ratio (OR) is used to interpret the results. An OR greater than 1 in a category indicates that there is a greater probability that the young girl or adolescent has good menstrual hygiene than the reference group. Conversely, an Odds Ratio of less than 1 means that there is a lower probability of the young girl or adolescent having good menstrual hygiene compared to the reference group in the category under consideration compared to the reference group.

3. Results and interpretation

Description

- Results of bivariate analysis

The bivariate analysis revealed a significant association between menstrual hygiene and all the explanatory variables in rural and urban areas and overall. However, for the *health district* and *age of the girl* variables, there was no significant association in rural and urban areas respectively. In the three health districts, the proportion of young girls and adolescents with poor menstrual hygiene is higher in rural areas than in urban areas, with the exception of Tiébissou where the situation is more serious in urban areas (91%) than in rural areas. It should also be noted that, overall, the situation is bleak in the Bouaké and Tiébissou health districts, where 75% and 83% of girls and teenagers respectively have poor menstrual hygiene. When we look at the religion of young girls and adolescents, the proportion of girls with poor menstrual hygiene is higher in rural areas than in urban areas, with the exception of girls of the evangelical religion, where the proportion of girls with poor hygiene in urban areas (75%) is higher than in rural areas.

Breakdown of girls with poor menstrual hygiene by socio-demographic and cultural variables, by area of residence

VARIABLES	Terms and conditions	Urban	Rural	Package
Health district	Bouaké	74%	76%	75%
	Korhogo	47%	75%	55%
	Tiébissou	91%	74%	83%
Daughter's religion	Other Christians	58%	78%	65%
	Evangelical	75%	73%	62%
	Catholic	59%	76%	74%
	Other religions/animists	46%	64%	60%
	Muslim	65%	68%	61%
	No religion	55%	83%	74%
Girl's level of education	Preschool	84,6%	50,0%	84,5%
	Primary	67,2%	76,1%	68,8%
	Secondary	62,2%	54,1%	61,4%
	Superior	57,0%	95,5%	57,2%
	Never attended school	67,7%	77,6%	71,4%
Household standard of living	Very Low	64,1%	62,5%	64,0%
	Low	59,9%	83,8%	74,8%
	Medium	82,8%	74,3%	77,6%

	High	60,0%	67,7%	60,7%
	Very High	68,5%	72,8%	69,5%
Girl's age	10-14 years	65,5%	82,7%	69,6%
	15-19 years	64,4%	75,2%	66,9%
	20-24 years old	64,8%	71,4%	66,3%
Household size	Small size	68,4%	72,7%	69,0%
	Medium size	64,0%	78,5%	67,2%
	Large size	61,7%	70,8%	64,9%
Type of water source	Improved water source	64,29%	74,96%	66,80%
	Unimproved water source	77,65%	92,79%	79,40%
Toilet type	Improved toilet	62,76%	69,65%	64,01%
	Unimproved toilet	74,75%	84,07%	78,65%

Source: Menstrual hygiene survey data, ENSEA 2020.

Analysis of poor hygiene among young girls and adolescents according to level of education shows that overall, and also in urban areas, the proportion of girls with poor menstrual hygiene is higher among girls who have never attended school and those at primary level than among the others. However, it should be emphasised that this proportion remains higher among pre-school girls than among those who have never attended school. In rural areas, the proportion of girls with poor menstrual hygiene The age of the young girl or adolescent could justify her poor management of menstrual hygiene in the sense that, according to the table, the older the girl, the lower the proportion of girls with poor hygiene.

Analysis of water and hygiene in the home highlights the existence of a link between the type of household water supply and a girl's menstrual hygiene. Whatever the area of residence (rural or urban), the proportion of girls with poor menstrual hygiene is higher in households with an unimproved water source. The same applies to the type of household toilet, as the proportion of girls with poor menstrual hygiene is higher in households with an unimproved toilet. This relationship holds true in both urban and rural areas.

- Results of the multidimensional descriptive analysis (MCA)

The Multiple Component Factor Analysis (MCAF) enables us to categorise adolescent girls and young women with poor menstrual hygiene practices in all three health districts, as well as in rural and urban areas (Figure X). In summary, it can be seen that girls with

poor hygiene overall live in rural areas in the Korhogo health district. They are married or in union and have never been to school. These girls live in households with a low or average standard of living, do not have an improved toilet and are headed by evangelical merchants who have never attended school. In urban areas, young girls and adolescents with poor menstrual hygiene are found mainly in the towns of Bouaké and Tiébissou. These are Catholic or evangelical girls who were attending school at the time of the survey and who have attained secondary education or higher. They live in households with an average or very low standard of living, headed by female managers, employees or shopkeepers. In rural areas, the practice of poor menstrual hygiene concerns young girls living in the villages of the Korhogo health district. Having never been to school, these girls are married or in union. They are made up of animist girls, other Christians (apart from Catholics and Evangelicals) and those who do not practise any religion. They are found in large households (more than 8 people) without an improved toilet and run by men.

In short, the results of the descriptive analysis made it possible to test the statistical link between menstrual hygiene management and the study's explanatory variables, and to categorise young girls and adolescents with poor menstrual hygiene.

Figure X: Categorisation of girls and adolescents with poor menstrual hygiene .
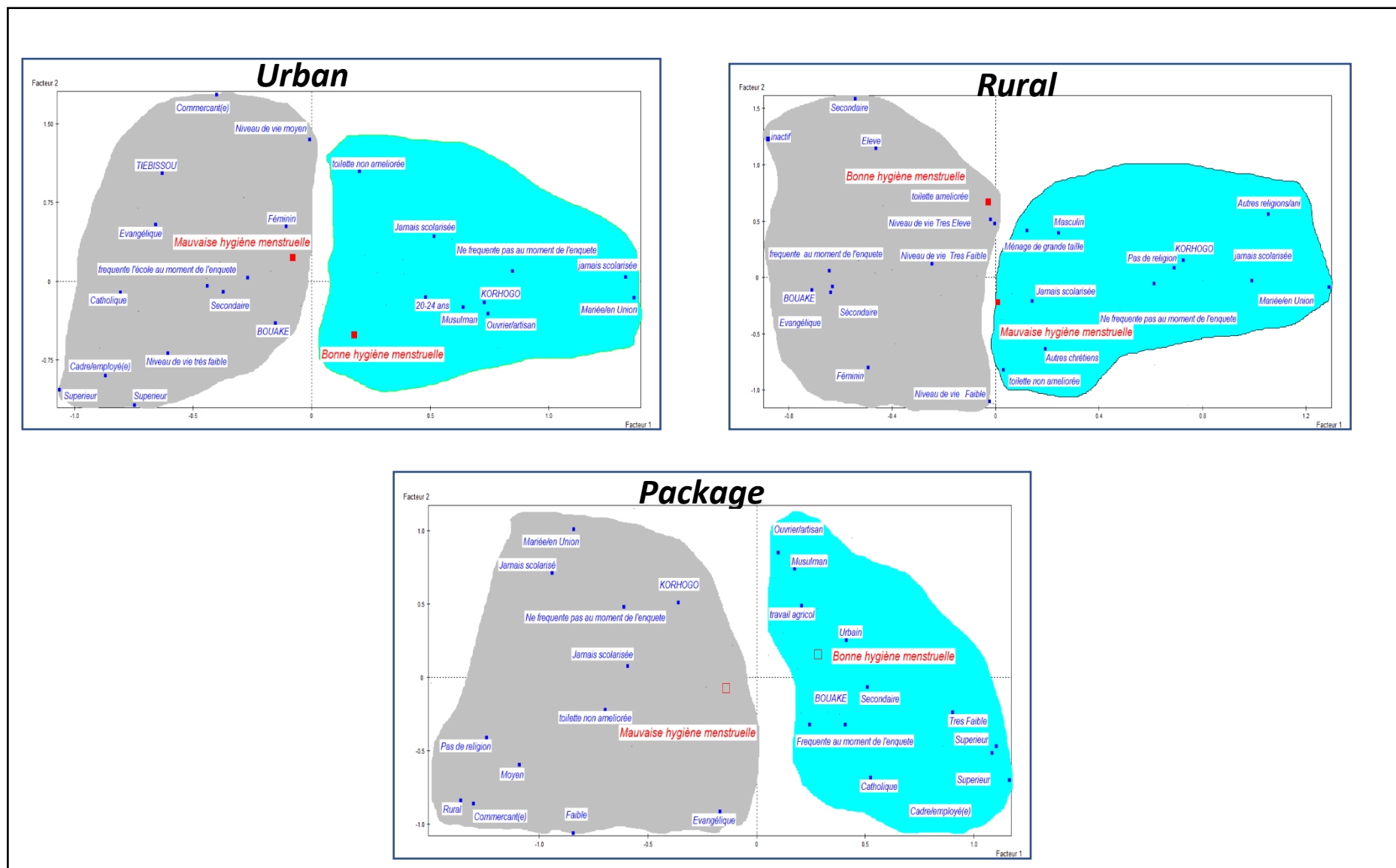
At the multivariate explanatory level

The results of the logistic regression are shown in table X. For both urban and rural areas, all the explanatory variables are significant (P≤0.05) except for marital status. The same is true for the rural environment, where all the variables are significant except for school attendance status at the time of the survey. Overall, girls and adolescents in the Tiébissou health district were less likely to have good menstrual hygiene than those in Bouaké (OR=0.853), while those in Korhogo were 4 times more likely to have good menstrual hygiene. This trend was also observed in urban areas, where girls in the Korhogo health district were more likely to practise menstrual hygiene than those in Bouaké and Tiébissou. However, when we focus on rural areas, we find that girls in the Tiébissou and Korhogo health districts are 2.26 and 1.7 times more likely to practise good menstrual hygiene than girls in the Bouaké health district. This situation could be explained by the fact that

With regard to place of residence, we found that overall, girls living in rural areas were 0.91 times less likely to have good menstrual hygiene than those living in towns. This could be explained by the fact that modernity in the city opens the door to certain values and standards of health and hygiene practices, which could lead urban girls to behave more hygienically. Another factor is the availability of modern menstrual management equipment, which is more widely available in towns than in rural areas. This accessibility is a differential factor between rural and urban girls.

In terms of marital status, there was no significant difference between married, widowed and single girls in the 3 health districts. For young girls and adolescents living in urban areas in the 3 districts, we found that unmarried girls were 0.636 times less likely to have good menstrual hygiene than those who were married or in union, while there was no difference between the latter and widows.

Table X: *Odds ratios from logistic regression analysis on having good menstrual hygiene.*

Independent variables	*All 3 health districts* (N=2166)	*Urban* (N=1444)	*Rural* (N=722)
Health district			
BOUAKE	*Ref*	*Ref*	*Ref*
TIEBISSOU	0,853**	0,255***	2,263***
KORHOGO	4,089***	6,509***	1,699***
Place of residence			
Urban	*Ref*		
Rural	0,906***		
Marital status			
Single	0,989ns	0,636***	1,342***
Married/In Union	*Ref*	*Ref*	*Ref*
Separated/Divorced	1,092ns	0,905ns	1,800ns
Gender of head of household			
Male	*Ref*	*Ref*	*Ref*
Female	0,771***	0,901***	0,461***
Level of education			
never attended school	*Ref*	*Ref*	*Ref*
Primary	1,219***	1,059*	1,075ns
Secundary	1,471***	1,411***	1,519***
Superior	3,342***	4,177***	71,597***
Household size			
small size	*Ref*	*Ref*	*Ref*
average size	1,057***	1,225***	0,523***
large size	0,909***	0,733***	0,799***
School attendance at the time of the survey			
Not currently attending	*Ref*	*Ref*	*Ref*
currently frequents	1,092***	1,158***	0,997ns
Type of water source			
unimproved water source	*Ref*	*Ref*	*Ref*
Improved water source	1,522***	1,465***	4,896***
Age			

10-14 years	*Ref*	*Ref*	*Ref*
15-19 years	1,152***	0,944**	1,696***
20-24 years old	1,189***	0,770***	2,191***
No one who told her about menstruation			
Mother	*Ref*	*Ref*	*Ref*
other family members	1,067***	1,074***	0,818***
other people	0,527***	0,450***	0,438***
No person	0,944**	1,361***	0,339***
Type of household toilet			
unimproved toilet	*Ref*	*Ref*	*Ref*
improved toilet	1,682***	1,463***	2,196***
Socio-professional category of head of household			
Manager/employee	*Ref*	*Ref*	*Ref*
agricultural work	1,058**	0,932***	0,672**
Clerk	0,573***	0,773***	0,330***
Services/domestic	1,004^{ns}	0,784***	1,000
Worker/craftsman	0,735***	0,616***	0,408***
inactive	0,804***	0,658***	0,444***
Religion			
Muslim	*Ref*	*Ref*	*Ref*
Catholic	1,830***	2,380***	0,922^{ns}
Evangelical	1,741***	1,480***	1,381***
Other Christians	2,066***	2,704***	0,585***
Other religions/animists	1,631***	7,260***	1,107^{ns}
No religion	1,000^{ns}	4,164***	0,438***
chi2	*12223432*	*13305410*	*3308892*

*** ; ** ; * significant at 1%, 5% and 10% respectively, ns not significant ; Ref :Reference mode,