

## Short Communication

### Factors influencing personal hygiene among primary schoolchildren in western Côte d'Ivoire

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#### ABSTRACT

Personal hygiene has an impact on the health, quality of life and academic performance of schoolchildren. The factors associated with it can be complex. We carried out our analysis based on a database on hookworms in schoolchildren in Côte d'Ivoire. This is a cross-sectional retrospective study, on 2,035 schoolchildren recruited from 30 schools in the western region of Côte d'Ivoire. The predictors of good personal hygiene for schoolchildren were the existence of a good level of sanitation at home (OR = 1.62; 95% CI = 1.24–2.13) and a primary school education as the minimum level of education for the father (OR = 1.48; 95% CI = 1.12–1.96). In contrast, students below the age of ten attending poor sanitary establishments are more likely to have poor personal hygiene (OR = 0.40; 95% CI = 0.22–0.73); therefore, it becomes necessary to provide good basic environmental sanitation for families and schools.

**Key words** | Côte d'Ivoire, personal hygiene, primary schools, pupils

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#### HIGHLIGHTS

- The study has the particularity of having been carried out on a large sample of students.
- It describes the hygiene practices of students in poor areas of the country.
- It identifies the risk factors independent of poor student hygiene.
- It provides guidelines for an effective fight against hygiene-related diseases in children.
- It is an aid for the improvement of the learning conditions of pupils.

#### INTRODUCTION

Personal hygiene refers to all practices to ensure the body's cleanliness, promoting and preserving good health, and they are public health measures to prevent disease according to the World Bank (Kremer 2007). Poor hygiene in schools can be traced to lack of sanitary facilities and potable

drinking water (Nzengya 2015). Diseases such as diarrhoea, dermatoses, intestinal parasites and respiratory diseases then become frequent (Sarkar 2013), with absenteeism as the inevitable outcome, which in turn affects academic results (Freeman *et al.* 2012).

However, programmes for promoting personal hygiene in schools exist and have demonstrated their effectiveness, like the WASH (water, sanitation and hygiene) programmes (UNICEF 2012).

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The factors associated with personal hygiene are complex and interrelated. Few studies have been carried out in Côte d'Ivoire on hand hygiene. In addition, no study has focused on the determinants of personal hygiene in students; but this period of childhood is conducive to developing good health behaviour. This poor knowledge base hampers the development of improved strategies to strengthen the maintenance of personal hygiene, which is of great importance in reducing the burden of communicable diseases. The objective of this study was, therefore, to analyse the question of personal hygiene using data from the school survey on hookworms in 2016 in Côte d'Ivoire (Kiki-Barro *et al.* 2017).

## METHODS

### Type of study and population

The study is a retrospective, cross-sectional and analytical study. It is based on a database generated from an original survey on hookworm infestation in school age children in three provinces in Côte d'Ivoire in 2016. Two questionnaires were used for data collection: one administered to students from the selected provinces by an interviewer to collect socio-demographic and school data; and the other, self-administered, aimed at parents to discover socio-economic conditions and family environment.

Students were selected by simple random survey in their schools. Details of the selection criteria for schools and students can be found in the literature (Kiki-Barro *et al.* 2017). The data used for this study are those collected in schools in the western region of Côte d'Ivoire. Schools in this region face a double challenge: insufficient access to drinking water and poor hygiene and sanitation. Indeed, this region shows an average value lower than the national average in terms of average index of hygiene facilities in schools (PASEC 2014).

### Data collection

The data collected were transferred to an Excel sheet for construction of new variables.

The personal hygiene variable was constructed with reference to the personal hygiene index developed by Jeyakumar & Ghugre (2017). Four items were used for personal hygiene (explained variables): hand hygiene, nail hygiene, shoe wearing and eliminating excreta in school (Table 1). When the practice observed was positive, the score of 1 was assigned. The level of personal hygiene was therefore calculated by adding the scores. Thus, the total personal hygiene score was between 0 and 8. A poor personal hygiene practice corresponded to a score less than or equal to 3, and a good personal hygiene practice corresponded to a score between 4 and 8.

The variables are the socio-demographic characteristics of the students, the area of residence, school sanitation, the socio-economic characteristics of families, and access to water and sanitation in households.

### Statistical analysis

The analysis of the data generated was performed using the Software R version 1.1.463.

Each variable was subjected to a descriptive analysis. The associations between the level of personal hygiene and the variable studied were explored using the  $\chi^2$  test in univariate analyses. A value of  $p < 0.05$  was considered to be indicative of a statistically significant association. For multivariate analyses, the analysis strategy was to include in the model all the variables that had a  $p$ -value less than 20% in univariate analyses. Relevant interaction terms were introduced and a top-down procedure was carried out again to find out if any interaction terms were significant

**Table 1** | Index for personal hygiene assessment

Hand hygiene	Nail hygiene	Shoe wearing	Excreta disposal
Wash hands	Have nails cut	Have shoes	Use toilets
Always wash hands before eating and after visiting the toilet	Keep nails clean	Always wear shoes	
Use soap and water to wash hands			
<b>Possible score 0–3</b>	<b>Possible score 0–2</b>	<b>Possible score 0–2</b>	<b>Possible score 0–1</b>

(significance level set at 5%). The variables involved in a significant interaction were maintained in the model.

### Ethical consideration

Permission was granted by the head of department of Parasitology-Mycology of the Faculty of Pharmaceutical and Biological Sciences, Félix Houphouët Boigny University, Abidjan, Côte d'Ivoire for the utilization of the database. The original file was anonymous.

## RESULTS

### Socio-demographic characteristics of pupils

The total number of our study population was 2,035 pupils. There was a male predominance with a gender ratio (M/F) of 1.42. The ages of the pupils ranged from 4 to 15 years old. The average age was 8.9 ( $\pm 2.25$ ) years. Most of the pupils were in preparatory classes (35%). About one-third of the pupils attended schools with no toilets available (32.38%) and the sanitation standard of the schools was poor in 80.64% of cases.

Most parents had never been to school (43% of fathers and 62% of mothers). If a little more than half of the fathers (57.49%) had a monthly income greater than or equal to the current minimum wage in Côte d'Ivoire of 60,000 XOF (90 euros), for about nine out of ten mothers, their income was below the SMIG (guaranteed minimum wage). Almost all of the parents are in a relationship (92.58%). The pupils are living mainly in rural housing (67.8%) and consumed improved drinking water (94.79%) (Table 2).

### Factors associated with personal hygiene

The multivariate analysis to explore the factors associated with the overall personal hygiene of pupils is presented in Table 3. The predictors of good personal hygiene in pupils are the existence of a good level of sanitation at home (OR = 1.62; 95% CI = 1.24–2.13) and a primary school education for the father (OR = 1.48; 95% CI = 1.12–1.96). However, the factors favouring poor hygiene in pupils are

**Table 2** | Socio-demographic characteristics of schoolchildren ( $N = 2,035$ )

Variable	n	%
<b>Characteristics of pupils</b>		
<b>Gender</b>		
Male	1,195	58.72
Female	840	41.28
<b>Class</b>		
Preparatory course	716	35.18
Elementary course	691	33.96
Middle course	628	30.86
<b>Age (years)</b>		
<10	1,232	60.54
10 and above	803	39.46
<b>Characteristics of school</b>		
<b>Number of toilets</b>		
No toilets	659	32.38
1–2	344	16.9
>2	1,032	50.71
<b>Sanitation in school</b>		
Good	394	19.36
Bad	1,641	80.64
<b>Characteristics of family</b>		
<b>Father literacy status</b>		
Illiterate	880	43.24
Primary	570	28.01
Secondary	385	18.92
Higher education	200	9.83
<b>Mother literacy status</b>		
Illiterate	1,267	62.26
Primary	508	24.96
Secondary	220	10.81
Higher education	40	1.97
<b>Father income (XOF)</b>		
<60,000	865	42.51
$\geq 60,000$	1,170	57.49
<b>Mother income (XOF)</b>		
<60,000	1,761	86.54
$\geq 60,000$	274	13.46
<b>Sources of water supply</b>		
Potable water	1,929	94.79
Not potable	106	5.21
<b>Type of housing</b>		
Rural/Slum	1,380	67.81
Urban	655	32.19

**Table 3** | Predictors of pupils' personal hygiene (N = 2,035)

Variables	Good personal hygiene		OR adjusted (95% CI)	P-value
	No n (%)	Yes n (%)		
<b>Characteristics of pupils</b>				
<b>Gender</b>				
Female	208 (24.8)	632 (75.2)	1	<b>0.000</b>
Male	433 (36.2)	762 (63.8)	0.58 (0.47–0.71)	
<b>Age (years)</b>				
10 and above	208 (25.9)	595 (74.1)	1	0.150
<10	433 (35.1)	799 (64.9)	1.54 (0.85–2.75)	
<b>Class</b>				
Elementary course	203 (29.4)	488 (70.6)	1	
Middle course	160 (25.5)	468 (74.5)	1.07 (0.79–1.44)	0.649
Preparatory course	278 (38.8)	438 (61.2)	0.73 (0.57–0.95)	<b>0.020</b>
<b>School sanitation</b>				
Good	73 (18.5)	321 (81.5)	1	<b>0.012</b>
Poor	568 (34.6)	1,073 (65.4)	0.56 (0.35–0.87)	
<b>Characteristics of household</b>				
<b>Type of housing</b>				
Modern	115 (17.6)	540 (82.4)	1	<b>0.000</b>
Rural/Slum	526 (38.1)	854 (61.9)	0.48 (0.37–0.64)	
<b>House sanitation</b>				
No	480 (29.3)	1,156 (70.7)	1	–
Yes	147 (43.9)	188 (56.1)	1.63 (1.24–2.12)	<b>0.000</b>
<b>Father literacy status</b>				
Illiterate	355 (40.3)	525 (59.7)	1	–
Primary	162 (28.4)	408 (71.6)	1.48 (1.12–1.96)	<b>0.006</b>
Secondary	91 (23.6)	294 (76.4)	1.30 (0.90–1.87)	0.161
Higher education	33 (16.5)	167 (83.5)	1.49 (0.89–2.56)	0.135
<b>Mother literacy status</b>				
Illiterate	476 (37.6)	791 (62.4)	1	–
Primary	124 (24.4)	384 (75.6)	1.33 (0.99–1.80)	0.059
Secondary	36 (16.4)	184 (83.6)	1.62 (1.00–2.65)	0.053
Higher education	5 (12.5)	35 (87.5)	2.18 (0.80–7.06)	0.153
<b>Age &lt;10 years * School sanitation</b>	–	–	0.40 (0.22–0.73)	<b>0.003</b>

more numerous. Indeed, male pupils have poorer hygiene than girls (OR = 0.58; 95% CI = 0.47–0.71). Pupils in the preparatory course (PC) class, the first level of the primary cycle also had poor personal hygiene compared to those in the elementary course (EC) classes, the second level of the primary cycle (OR = 0.73; 95% CI = 0.57–0.9). Regarding school environment, students attending schools with

poor sanitation are more likely to have poor personal hygiene, especially when they are younger (below ten years old) (OR = 0.40; IC95% = 0.22–0.73), compared to students above ten years studying in the same environment. Regarding family environment, students living in rural settlements or in slums are the ones most at risk of having poor personal hygiene (OR = 0.49; 95% CI = 0.37–0.64).

## DISCUSSION

The study carried out in primary schools in the western region of Côte d'Ivoire showed that the family and school environment are not always conducive for the adoption of the recommended hygiene practices for good health. Thus, when the pupils live in houses with good sanitation, they have better personal hygiene. However, when living in a rural or slum settlement, the risk for students having poor personal hygiene was twice as high. In these disadvantaged areas, it is sometimes difficult to afford adequate sanitary facilities (Jeyakumar & Ghugre 2017); a situation which was found in the study carried out by UNICEF in Benin in 2012 (Bénin-WSP 2012). In addition, the level of sanitation in schools negatively influenced the personal hygiene of pupils, especially among the younger ones. In primary schools, the younger pupils generally attend PC classes, where the risk of poor personal hygiene is higher. According to UNICEF recommendations, sanitary facilities in primary schools should take into account the age of children.

Analysis of family characteristics found that pupils whose fathers had primary education had better personal hygiene compared to children of illiterate fathers. Studies by Sarkar in India and Vivas in Ethiopia have shown a significant association between personal hygiene practices in primary schoolchildren and the literacy status of their mother, or both parents (Vivas *et al.* 2010; Sarkar 2013). According to Lopez-Quintero *et al.* (2009), students informed by their parents about hand hygiene, for example, are twice as likely to wash their hands effectively. However, information alone may not be sufficient to encourage the adoption of good hygiene practices. The literature therefore suggests the implementation of actions involving the family, educational staff and health care staff (school nurse). These interventions include the provision of water, sanitary products and/or the placing of posters in strategic locations (Malherbe *et al.* 2013). This type of intervention could be integrated into the school curriculum (Malherbe *et al.* 2013; Vishnupriya *et al.* 2014). Parental education is an indirect indicator of the socio-economic level of the household. Most of the pupils came from families with poorly educated parents, with low incomes and where fathers are the main providers and therefore the only ones to bear the family expenses. In these situations, hygiene practices may not be

considered a priority for families with often difficult living conditions. While personal hygiene was not linked to improved water supply in our study, in Ethiopia, Vivas *et al.* (2010) showed that hygiene practices required sufficient water. Indeed, personal hygiene is no longer a priority when water is scarce. Rather than using water for personal cleanliness, families prioritize using available water for drinking, cooking and cleaning.

## Limitations of the study

The database is the result of a cross-sectional study that collected self-reported data. This could have influenced the results through a desirability bias.

## CONCLUSION

In primary schools in the western region of Côte d'Ivoire, good personal hygiene was noticed more among the pupils living in a healthy family environment and having an educated parent, specifically the father. In contrast, inadequate sanitation at home and at school favoured poor hygiene practices, especially among younger children. Hygiene practices among boys are poorer compared to those of girls. Making functional basic health facilities (drinking water and sanitation) available to families and schools is essential to instil good personal hygiene practices in students.

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## DATA AVAILABILITY STATEMENT

All relevant data are included in the paper or its Supplementary Information.

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