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HYGIEN AND SANITATION PROBLEMATIC IN PRIMARY SCHOOL OF ALLADA COMMUNE IN BENIN REPUBLIC (WEST AFRICA)

Léocadie ODOULAMI*, Grégoire A. BEWA

Pierre PAGNEY Laboratory, Climate, Water, Ecosystem and Development
LACEEDE/DGAT/FASHS/ University of Abomey-Calavi (UAC), 03BP:1122 Cotonou
2DGAT/FLASH/University of Parakou (UP), Republic of Benin (East Africa West);
leocadio@yahoo.com

The insufficiency of hygiene and sanitation in the Allada commune particularly influence the health of schoolchildren. This research analyzed the effects of the precariousness of the basic hygiene and sanitation practices on the health of schoolchildren in this commune. For this research, 600 schoolchildren were selected by random cluster survey to observe their hygiene practices and especially to measure the prevalence of helminthiasis. Data were collected through documentary research, questionnaire surveys, observation and microbiological analyses of stool collected from schoolchildren. Statistical analyses were performed using Epi Info version 7 software. The analysis shows that diseases linked to poor hygiene and sanitation are acted severely in the Allada commune and affect the health of schoolchildren. In fact, cases of gastrointestinal disorders were found in 51.80% of these schoolchildren. The parasites identified are mainly protozoa, responsible for gastroenteritis diseases. Faced with this result, which gives rise to concerns, it is important for the communal and government authorities to provide the commune's schools with adequate sanitary infrastructure, to train educators in good hygiene and sanitation practices and to implement place school clubs for the promotion of hygiene and sanitation in order to reduce the vulnerability of the population of Allada commune.

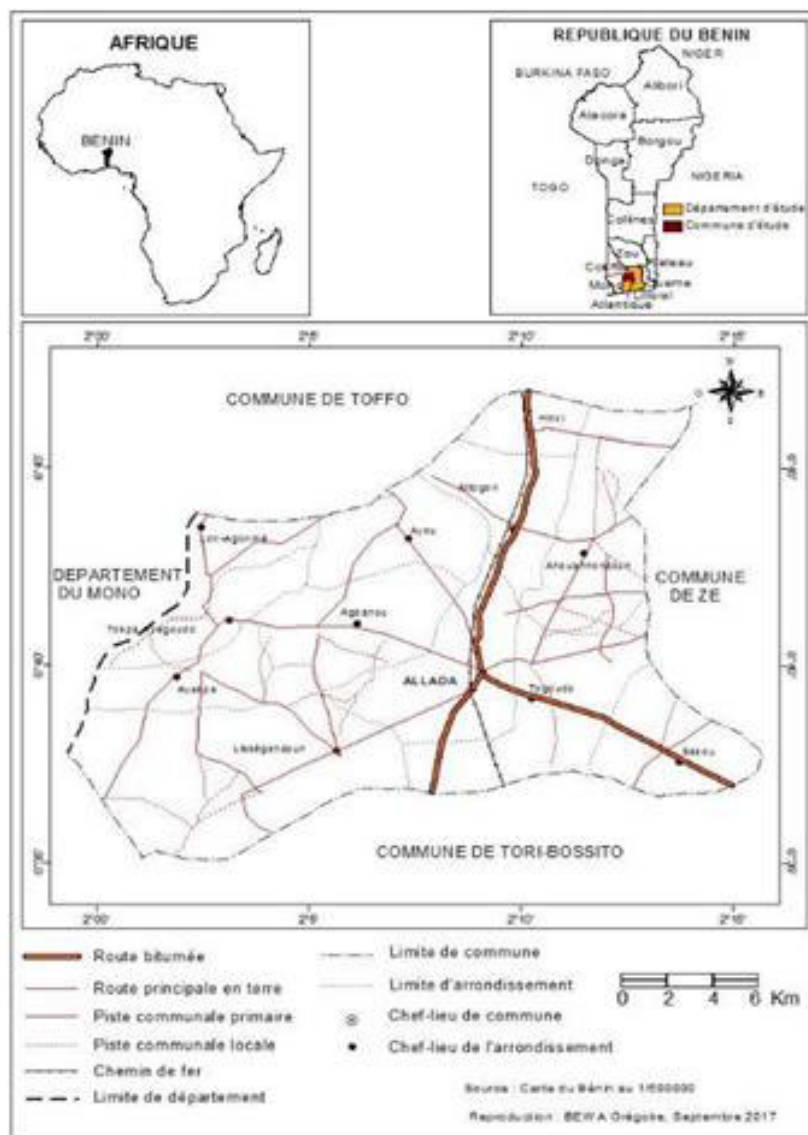
Keywords: Allada commune, Benin Republic (West Africa), Hygiene, sanitation, schoolchildren health

INTRODUCTION

Most countries in the world are confronted with practices that do not comply with hygiene and sanitation standards. This represents a threat to human health. To remedy this situation, international (United Nations institutions) and national organizations are seeking to improve these hygiene and sanitation practices in order to secure global public health. Benin, like other nations, has made commitments that will be realized (Vissin *et al.*, 2012; Vigninou *et al.*, 2012; G-EMERGENCY SARL, 2018). But approaches such as Community Led Total Sanitation (CLTS), Hygiene and Sanitation Promotion (HSP), Information, Education and Communication for Behavior Change (IEC/BC) and Sanitation Marketing are used especially in the North where 80% of the population practice opens defecation for lack of toilets. This has led the population to adopt hand washing techniques, preservation of drinking water quality, maintenance of the living environment,... Thus, 1315 localities have reached the status of End of Open Air Defecation (FDAL) and 600 localities are waiting for their pre-certification (MCDIPAPHYR, 2018). However, the entire country is not covered to limit infections related to uncleanness due to the precariousness of household incomes that have difficult access to socio-sanitary structures in some localities of the country (Yadouléon, 2015). This is the source of vulnerability of some social strata in particular that of schoolchildren in the commune of Allada (Bêwa, 2018). Indeed, dubious hygiene and sanitation practices are observed among

schoolchildren in the commune of Allada who are the subject of this research. To do so, materials and methods are used to arrive at the results and discussion.

Located between 6°36' and 6°47' north latitude and between 1°58' and 2°15' east longitude, the commune of Allada is bordered to the north by the commune of Toffo, to the south by the commune of Tori-Bossito, to the east by the commune of Zè and to the west by the communes of Kpomassè and Bopa. It covers 85 villages and city districts spread over twelve (12) arrondissements (Map 1).



Map 1. Geographic location of the commune of Allada

MATERIALS AND METHODS

The study was conducted from March 2 to April 31, 2018. It is based on surveys conducted in schools and households and observation of hygiene practices of schoolchildren aged 6 to 13 years. The criteria of personal hygiene namely washing fruits before consumption, hand washing before meals and walking barefoot were observed. This phase was completed by sampling and analysis of the schoolchildren's stools in the laboratory. This target was chosen because the consequences of poor hygiene and inadequate sanitation primarily affect children. Cluster random sampling was adopted. The sample size was determined using Schwartz's formula:

n = sample size

E = confidence level derived from the confidence rate (1.96 for 95 %)

P = estimated prevalence of intestinal parasitosis among children in Benin (20%) (EDSB, 2011-2012)

I = Desired precision: 5 %.

Fc = Cluster effect correction factor = 2

A relative risk equal to 1.96 was chosen, i.e., a reduced variance equal to 1.96, a precision of 0.05 and a cluster effect correction factor equal to 2.

n = 491

In accordance with the number of samples accepted in this type of sampling, which should be greater than or equal to 30 clusters, the choice of clusters retained is 30. After dividing the sample size by the total number of clusters allowed, a total of about 16 students rounded up to 20 was obtained. Thus, the sample of schoolchildren in the commune consists of 30 clusters of 20 students each. By multiplying the 20 students by the 30 clusters, we obtained a total of 600 students for the survey.

- Selection of survey schools

30 PPEs (clusters) were identified by random sampling out of 64 PPEs according to SNV BENIN / DNSP (2012)

- Selection of classes and students

The CE2 class was identified in the 30 PPEs because the majority of schoolchildren in this class are in the 6 to 13 age group. This age group was chosen as a criterion for selecting the schoolchildren, taking into account statistics from the school district of the commune of Allada (SNV BENIN/DNSP, 2012), which mention that the majority of schoolchildren in these classes are in this age group.

Each PPE is made up of 3 pedagogical groups of one CE2 class each. The three classes in each PPE were then enrolled in the survey process. A total of 90 third-grade classes were surveyed, with 20 students randomly assigned to each group. In total, 600 third-grade students were selected in the commune.

Also, the stools of the pupils were collected in a tube (transparent and hermetically sealed jar with a small spoon for collection) given to each pupil the day before the stool collection. The next morning, the tubes containing the stools were collected and sent directly to the hospital in Allada for analysis in the laboratory. This operation was repeated three times, with a two-day interval between each sample taken from each schoolchild surveyed. This frequency is justified because according to Ogouyèmi-Hounto et al, (2016), a single sampling is not sufficient to report on parasitic infestation. Subsequently, a direct microscopic examination or parasitology in physiological water and a concentration technique according to the Willis method were done on these collected stools.

- Direct examination

The stools are examined at 37°C immediately after their arrival in the laboratory in order to avoid the fragmentation of certain parasites which live naturally in the intestinal lumen and which disappear sometime after their emission. A fraction of each stool is homogenized with a drop of NaCl solution and mounted between slide and coverslip, then examined under a microscope at 240 or 400× magnification (objective 40×, eyepiece 6 or 10×). Liquid stools do not require this conditioning. This preparation must be transparent to facilitate reading the characters of a common printed text. The addition of lugol to this prepared solution highlights the cysts. Indeed, lugol stains the membranes, cytoplasmic and nuclear structures of the cysts and allows the identification of morphological characteristics.

- Willis concentration technique

This technique is relatively simple and increases the sensitivity of the search for cysts or eggs. It consists of mixing the stool with a concentrated solution of high density salt that promotes the floating of parasite eggs. This technique allows the collection of eggs on the surface.

The procedure consists of placing a piece of stool the size of a peanut seed in a "Peni" bottle, to which Willis' solution is added at a quarter of the bottle. The contents are then mixed with an applicator. The same solution is added again to fill the bottle. This vial is then slowly covered with a slide in order to avoid air bubbles.

The device is left to rest for 10 minutes; then the slide, carefully impregnated with a drop of the mixture, is carefully removed. It is then placed on a slide and examined immediately under the microscope to prevent the solution from drying out. Data and information collected were entered and processed in Epi Info version (7) software and others encoded in Excel 7 spread sheet and Word was used for text support. Descriptive statistics were used in the analysis of these processed data and information. The 95% confidence intervals were used in the estimation of the hygiene and sanitation indicators. Pearson's chi-square test and Fisher's exact test were used in the association between two categorical variables at the 5% level.

RESULTS AND DISCUSSION

The results are organized into two main areas:

- the hygiene practices of school children in the commune of Allada, and
- the effects of basic hygiene and sanitation practices on the health of these school children.

Hygiene of schoolchildren in the commune of Allada

Several factors determine the hygiene of schoolchildren in the commune of Allada in Benin. These include personal hygiene and the hygiene and sanitation of habitats.

Personal hygiene of schoolchildren

In the schools of the commune of Allada, personal hygiene is practiced differently by schoolchildren depending on their needs. Only 28 percent of students wash fruit before eating it, compared with 72 percent who do.

The high percentage of those who do not wash fruits before tasting them shows the deficit of hygiene education in schools. This is dangerous for the health of these school children.

In the same way, the washing of the hands after the emission of the stools, is not done by all the schoolboys. It is practiced randomly depending on where the need arises (Figure 1).

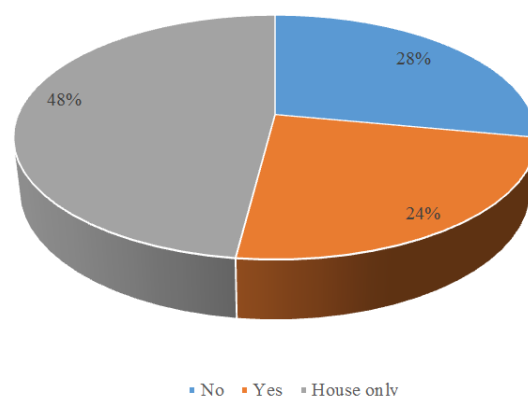


Figure 1. Hand washing after bowel movements of school children in Allada.

Source: Fieldwork, G.A. BEWA, November 2016

Figure 1 presents the places where hand washing is practiced or not practiced after bowel movements. It shows that 290 schoolchildren or 48% of schoolchildren practice handwashing after stools at home against 166 or 28% who do not do so at all. Only 144 students or 24% do so at school. The lack of handwashing among schoolchildren can be explained by the inadequacy of handwashing facilities and latrines in some schools and homes in the commune of Allada.

The number of schoolchildren who wash their hands after bowel movements at home indicates that these homes have toilets and handwashing facilities. Indeed, only 37.2% of householders have a latrine (G.A. Bêwa, 2018). This paltry rate in toilets does not facilitate the education of schoolchildren in the commune of Allada in personal hygiene. Also, the commune's drinking water service rate, which was only 37.1% (MEEM, 2017), also limits access to water and, by extension, handwashing

for schoolchildren. Indeed, only 39.59% of households have a high economic level compared to 14.04% low economic level households (G.A. Bêwa, 2018).

This socioeconomic disparity also makes it difficult to supply handwashing soap. This makes it difficult to observe proper hygiene. It is therefore necessary that schools are equipped with toilets and handwashing devices with soap sufficient to meet the needs of schoolchildren. Also, the maintenance of these facilities must be done regularly to interest the users who are mostly school children. This would be accompanied by continuous education of school children. Similarly, hand washing before meals, an indicator of personal hygiene, is observed among schoolchildren in the commune of Allada (Figure 2).

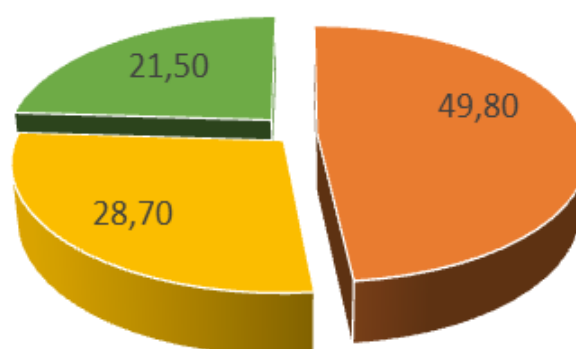


Figure 2. Handwashing before meals
Source: Fieldwork, G. A. BEWA, November 2016

Figure 2 presents the personal hygiene practices of school children. It shows that these practices are diversified depending on the location. Only 21.50% wash their hands and have a handwashing device at home. This facilitates their education in hygiene and sanitation techniques. Those who do it at school only are 28.70%. They can be considered as conformists to the personal hygiene education received at school. But, the largest one, 49.80%, seems to be uneducated in personal hygiene.

The IEC (Information, Education and Communication) approach should be used sufficiently to change these behaviors that are dangerous to their health. Indeed, handwashing decreases the number of deaths from infectious diseases in children (Vigninou et al., 2012). Schmidt et al (2009), in studying the determinants of handwashing practices, noted that out of a total of 5182 respondents in Kenya in 2009, only 25% practiced handwashing after bowel movements.

According to these authors, there is a strong relationship between socioeconomic status and handwashing. This finding is echoed by Sohounon (2017), who emphasizes the importance of having clean water at home for good household hygiene; also, Yalcin et al. (2004) conducted a study in 7 schools in Konya, Turkey in 2004 proving that 42.4% of respondents wash their hands before meals. This rate, higher than those who do so in the commune of Allada, is attributed to the presence of water and soap in some schools. Thus, water and soap are essential for good hygiene practice. This refers to the expenses that households will face if the socio-economic conditions allow it. The other indicator of personal hygiene and sanitation also observed among school children is walking barefoot.

It was found that 149 school children protect their feet with shoes before walking.

This means that these schoolchildren were informed of the dangers they would face if they did not protect their feet. In contrast, 451 students do not protect their feet. This large number of students proves that they are not sufficiently informed about the risks of walking barefoot. This includes the transcutaneous transmission of worms in the form of larvae found on the ground, such as anguillu and hookworms. It is necessary that school children are sufficiently informed about the health risks associated with walking barefoot. It is also important for understanding these behaviors to observe the hygiene and sanitation of the schoolchildren's homes.

Hygiene and sanitation in the home

A house requires basic facilities such as clean water, an adequate toilet and general hygiene. These criteria are used to classify the homes in the commune of Allada (Table 1).

Table 1. Results of surveys on household hygiene in the municipality of Allada

Variables	Absolute frequency	Percentage	IC 95 %
Existence of home latrines			
No	378	63,00%	[59,00 - 66,90]
Yes	222	37,00%	[33,10 - 41,00]
Total	600	100,00%	-
Household water source			
Improved	417	69,50%	[65,60 - 73,10]
Unimproved	183	30,50%	[26,90 - 34,40]
Total	600	100,00%	-
General hygiene of the house			
Not satisfactory	335	55,90%	[51,80 - 59,90]
Satisfactory	264	44,10%	[40,10 - 48,20]
Total	599	100,00%	-

Source: Fieldwork, November, 2016

Table 2. Stool infections in schoolchildren in the commune of Allada

Variables	Absolute frequency	Percentage	IC 95 %
Result of the stool analysis			
No	289	48,20%	[44,10 - 52,20]
Yes	311	51,80%	[47,80 - 55,90]
Total	600	100%	
Deworming			
less than 3 months	167	27,80%	[24,30 - 31,60]
more than 3 months	433	72,20%	[68,40 - 75,70]
Total	600	100%	
Type of parasites identified			
<i>Ascaris lumbricoides</i>	86	14,30%	[11,70 - 17,50]
<i>Endolimax nana</i>	7	1,20%	[0,50 - 2,50]
<i>entamoeba coli</i>	126	21,00%	[17,90 - 24,50]
<i>Entamoeba histolytica</i>	33	5,50%	[3,90 - 7,70]
<i>Giardia intestinalis</i>	59	9,80%	[7,60 - 12,60]
Negative	311	51,80%	[47,80 - 55,90]
Total	600	100%	
Digestive protozoa and helminths			
Amibes	166	27,70%	[24,20 - 31,50]
Flagellés	59	9,80%	[7,60 - 12,60]
Helminths	86	14,30%	[11,70 - 17,50]
Negative	289	48,20%	[44,10 - 52,20]
Total	600	100%	

Source: fieldwork, G.A. BEWA, November 2016.

On the other hand, compared to other studies conducted in Africa, this prevalence of 51.80 % is lower than that reported in the region of Kisangani in the Democratic Congo, whose rate is 62 % (Nimo Ngbabo, 2008). The latter value reflects poor hygiene, which favours infestation by ingestion of soiled food. The relatively high rate revealed in the schools of the commune of Allada can be explained by the poor hygiene and sanitation conditions of schoolchildren. Indeed, the high frequency of germs and parasites observed is related to the lack of regular deworming (Table 3).

Table 3. Stool examination results by deworming practice

	Results of the stool analysis		
	<i>Negative</i>	<i>Positive</i>	<i>Total</i>
Deworming			
<i>No</i>	177	256	433
<i>Yes</i>	112	55	167
<i>Total</i>	289	311	600

chi-square unadjusted and $p=0.001$, difference is significant

Source: Surveys, G.A. Bêwa, November 2016

Between stool examination and deworming practice, it appears that there is a link because out of a total of 167 subjects dewormed in the last three months prior to the surveys, only 55 have pathogenic germs and parasites and the proportion of dewormed subjects with a negative result is 112. Of 433 subjects not dewormed during this period, 256 had parasites in the stool. Therefore, deworming contributes to lowering the viral load in individuals.

CONCLUSION

Poor hygiene and sanitation practices have adverse effects on the health of the population, especially school children in the commune of Allada in Benin. Indeed, many of them are not used to washing their hands regularly after bowel movements or before meals and many walk barefoot. In addition, public and household hygiene and sanitation infrastructures remain insufficient for good hygiene and sanitation practices. This results in parasitic diseases that especially affect the health of school children. It is essential that the communal and governmental authorities, with the participation of the population, equip the commune of Allada with suitable hygiene and sanitation infrastructures and that the IEC (Information, Education and Communication) approach be used intensively for the appropriation of hygiene and sanitation techniques in the commune of Allada, in particular in schools and in Benin. Personal hygiene, which is generally neglected by schoolchildren and which has not been taken into account here, would be the subject of scientific research.

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