

## Determinants of hygiene and sanitation in schools in the Nkafu quater, Kadutu health zone, Bukavu in South Kivu, DRC

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**ABSTRACT:** *Introduction:* For thousands of years humanity has been struck by epidemics, scourges. Schools determine in part the health and well-being of children by providing them with a healthy or unhealthy environment. In South Kivu, the population is confronted with insufficient drinking water, inadequate sanitation facilities, including public latrines, garbage cans, public dumps.

*Methodology:* This is a cross-sectional study involving 401 respondents including 384 students and 17 heads of schools. Data collection was done using the survey questionnaire and an interview guide. The data analyses were done with SPSS v23 software.

*Results:* The level of hygiene and sanitation practice is low (46.4%). This would be significantly associated with lack of access to water in schools, insufficient handwashing kits, non-drinkability of water used at school, absence of garbage cans and health days, non-washing of hands with soap before consuming food, non-participation in cleaning and maintenance, absence or poor quality of urinals in some schools, the non-separation of latrines for girls and boys, ignorance of the dangers of lack of hygiene and basic sanitation at school, poor construction of latrines, and non-washing of hands with soap after toilet ( $p < 0.05$ ).

*Conclusion:* The practice of hygiene and sanitation remains weak and this must involve a collective awareness to find life-saving solutions in the training schools of executives.

**KEYWORDS:** Hygiene and sanitation, schools, Nkafu quater.

### 1 INTRODUCTION

For thousands of years humanity has been struck by epidemics and scourges. The literature and much careful research on small living organisms indicate that the major causes of the world's scourges are due to the lack of implementation and inadequacy of sanitation facilities in urban and rural areas [1]. In particular, we can note the hygiene in the school environment under this vision. Hygiene in schools can be defined as the set of measures designed to protect the health and safety of the people who attend them. Hygiene measures are all the more important as the school welcomes young children who constitute the age group of the population most exposed to the risk of infection [2].

In 2013, UNICEF reported a coverage rate of less than 50% for drinking water and sanitation in primary schools. While these figures give us a global view of challenges, they hide strong regional disparities. In addition, in equipped schools, the facilities are not always functional (maintenance errors) and do not always meet all the demand (over-attendance) [3]. Schools determine in part the health and well-being of children by providing them with a healthy or unhealthy environment. School water and sanitation facilities are increasingly considered essential to promote good hygiene practices and the well-being of children, but many schools have facilities that leave much to be desired [4].

In France, Doumont and Feulien (2013) show a negative perception of school sanitation: 88% of respondents find toilets smelly; 84% find them dirty; 83% confirm the absence of supervisors; 60% deplore the lack of toilet paper; 58% consider their number insufficient; 51% note the lack of closing at the doors; 46% think they are too far from the classroom. Stomach aches are common: 7% of students say they have it very often and 10% often; 9% of students feel embarrassed to do their work in middle school because they were unable to use the toilet in a timely manner [5]. In India, girls miss 5 days of school in a month (50 days a year) due to a lack of adequate protection during their periods and 23% of girls dropped out of school after they started menstruation [6]. In 2016, Ethiopia had 8.4 million children of primary school age. One in five primary schools had handwashing facilities, but only one in ten facilities offered handwashing facilities that were accessible to young children. Nearly nine out of ten primary schools had toilets, but less than half were accessible to young children [7].

In Zambia, a quantitative analysis of data collected from 10,000 schools found that the presence of improved sanitation facilities was correlated with a higher female-to-male enrolment ratio, as well as a reduction in repeated absences and drop-out rates, especially among girls [8].

The Democratic Republic of Congo is a country where the mortality rate is too high due to diseases of dirty hands that continue to increase on a large scale. Between 2013 and 2017, the DRC reported an estimated 151,000 cholera-related cases and 3,304 deaths. In 2018 and 2019, the number of suspected cholera cases was quite similar, but in 2019, the number of deaths decreased by 51% compared to 2018. Between January and early October 2020, the number of suspected cases and deaths decreased by 30% compared to the same period in 2019 [9]. In South Kivu, the population is now confronted with the insecurity caused by identified armed men, the insufficiency of drinking water, the total insufficiency of sanitary facilities, including public latrines, garbage can, public dumps.

In the schools of the Nkafu quater in Kadutu Health Zone, it is appropriate to observe several schools with degrading hygiene and sanitation systems that leave much to be desired. These schools are sometimes without latrines and if there are latrines, they are unsuitable, not having handwashing systems. This study aims to contribute to the promotion of good hygiene and sanitation conditions in schools in the Kadutu health zone in the city of Bukavu. Specifically, determine the level of hygiene and sanitation practices in schools in the Nkafu neighborhood in Kadutu Health Zone and determine the determinants associated with hygiene and sanitation in school settings in Kadutu Health Zone.

## **2 MATERIALS AND METHODS**

### **2.1 STUDY FRAMEWORK**

The NKAUFU is located in kadutu health zone in the city of Bukavu, South Kivu province, Democratic Republic of Congo. It is located between 2°28° and 2°33° south and on 28°49° and 28°53° east longitude. It is limited to the north by the coast of Lake Kivu, to the south by the road section of road No. 2 between the HERI KWETU center and ISTM/Bukavu to SOS; to the east by the KAHUWA river and the west by the WESHA river which separates the commune of Bagira from that of Kadutu. The area of 268.054,05m<sup>2</sup> is 268.05m<sup>2</sup>. The hydrography of the NKAUFU district is characterized by its belonging to the Kivu basin with its main rivers which are the Weshatnd Kahuwa rivers. In every cell in the neighborhood there are ravines that are very important. We note the presence of that of the ISDR (Higher Institute of Rural Development of Bukavu) towards the general hospital, from TST to the clinic in Kadurhu towards Inga.

### **2.2 TYPE OF STUDY**

We used a cross-sectional study Because it allowed us to describe the characteristics of the students attending the schools of the Nkafu quater, but also to describe the level of hygiene and sanitation at the level of these schools as well as the determinants associated with them in a reasonable time or in a short time.

### **2.3 STUDY POPULATION**

It is made up of pupils and school authorities of the schools surveyed located in the Nkafu quater of Kadutu Health Zone.

### **2.4 CHOICE AND SIZE OF SAMPLING**

#### **2.4.1 SAMPLE SIZE**

The sample size was calculated using Schwartz's formula that:

$$n = \frac{Z^2 \alpha \cdot P (1-P)}{d^2} = \frac{(1,96)^2 \cdot 0,5 (1-0,5)}{(0,05)^2} = \frac{3,8416 \cdot 0,5 \cdot 0,5}{0,0025} = \frac{0,9604}{0,0025} = 384,16 \approx 384 \text{ surveyed}$$

n= Sample

$Z^2\alpha$  = Coefficient corresponding to the degree of confidence at 95% (equivalent to 1,96)

p= proportion on the use of hygiene and sanitation measures (we considered or retained a proportion of 50%) or 0,5 as the proportion was not known in view of the existing literatures in south kivu to date in relation to this theme)

d= Margin of error which is equal to 5%

Thus, in our study we investigated a total of 401 respondents, including 384 students and 17 school authorities.

#### 2.4.2 SAMPLING TECHNIQUE

We used a systematic random sampling technique for students and comprehensive random sampling for school leaders involved in the study.

#### 2.4.3 METHOD

We used the descriptive and analytical method because it allowed us to describe the different characteristics of the students surveyed and analytical because it helped us to determine the factors that are associated with hygiene and sanitation in the schools of the Nkafu quater.

### 2.5 TECHNICAL

#### 2.5.1 THE DOCUMENTARY REVIEWS

This technique helped us to make a documentary review in different books, scientific journals, reports, websites corresponding to data related to hygiene and sanitation in schools in order to allow us to deepen the theoretical knowledge related to this subject of study.

#### 2.5.2 SURVEY QUESTIONNAIRE

A survey questionnaire: both closed and open questions were sent to students and school leaders in the schools targeted by our research in the Nkafu quater of Kadutu Health Zone.

### 2.6 INCLUSION CRITERIA

All pupils regularly enrolled in one of the schools in the Nkafu district of Kadutu Health Zone;

- Be the head of the schools targeted by the study
- Agree to answer the questionnaire

### 2.7 EXCLUSION CRITERIA

- Pupils regularly enrolled in schools in Kadutu Health Zone whose schools are not in the Nkafu quater;
- Non-volunteers (pupils/school authorities) to participate in the study.

### 2.8 STUDY VARIABLES

- a. **Dependent variable:** Hygiene and sanitation practice in schools
- b. **Independent variable:** Socio-demographic characteristics; the level of hygiene and sanitation practices; diseases related to poor hygiene and basic sanitation in schools; factors associated with hygiene and sanitation in schools.

**2.9 DATA ANALYSIS**

We did the input mask, encoding, data analysis and table production using Microsoft Excel 2016 and SPSS version 23.0 software. First, we used the Odds Ratio (OR) to compare the study variables. Thus, we considered the difference to be significant when the p-value was < 0.05. The opposite showed that there is no statistically significant difference. Next, we did a logistic regression to determine an adjusted OR to identify factors associated with hygiene and sanitation in school settings.

**2.10 ETHICAL CONSIDERATION**

We obtained informed consent from pupils (with practical guidance from their teachers) and selected school leaders prior to data collection (before investigating them). Participation in this study was free and free of all forms of constraints. The data was collected anonymously and the confidentiality of the results was ensured.

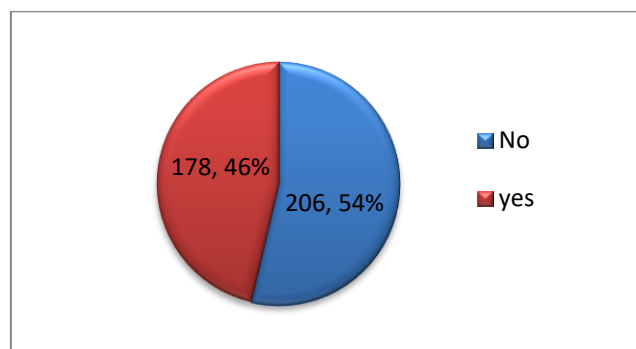
**3 RESULTS**

In this part, we present the different results found in the field related to the subject of study.

*Table 1. Socio-demographic characteristics of respondents*

Parameters	N=384	%
<b>Age trache (medium, ±AND)</b>	<i>16±3,8 years</i>	
10 -15 years	155	40,4
16-23 years	229	59,6
<b>Sex</b>		
Masculine	185	48,2
Feminine	199	51,8
<b>Class</b>		
1st year secondary school	2	0,5
2 <sup>nd</sup> year of secondary school	38	9,9
3rd year of the humanities	23	6,0
4th year of the humanities	78	20,3
5th year of the humanities	141	36,7
6th year of the humanities	102	26,6
<b>Religion</b>		
Catholic	131	34,1
Kimbanguist	11	2,9
Muslm	25	6,5
Protestant	208	54,2
<b>Without religion</b>	9	2,3
<b>Type of school</b>		
Tarpaulin Construction	1	0,3
Construction in wood	94	24,5
Construction in sustainable materials	231	60,2
Constructtion in semi-sustainable materials	58	15,1
<b>Category of School</b>		
Conventional (state-Church)	68	17,7
No conventional (State)	46	12,0
Private	270	70,3

It appears that most of the pupils surveyed were in the 16-23 age group with an average age of 16. Girls were in the majority than men with a sex ratio of 0.92 in favor of men. Most of the students interviewed were in Grade 5 followed by Grade 6 In the Humanities. Protestant and Catholic students were in the majority in the survey. The majority of students surveyed said their schools were built of sustainable materials. The students who were interviewed were more from private schools in the Nkafu quater of Kadutu Health Zone.



**Graphic 1. Level of hygiene and sanitation practices in schools**

The level of hygiene and sanitation practice was 46% of schools in the Nkafu district of Kadutu Health Zone Against 54% of the respondents had not admitted to having held a good quality of hygiene and sanitation within their schools. This shows that in the schools of the Nkafu district have the level of hygiene and sanitation is very low compared to hygienic conditions and basic sanitation.

**Table 2. Determinants of lack of hygiene and sanitation in schools in the Nkafu quarter of Kadutu**

Parameters	OR Adjusted	IC to 95%		P-Value
No access to water in the property	<u>0,2542</u>	<u>0,1662</u>	<u>0,3889</u>	<u>0,0000</u>
Lack of hand washing kits	<u>0,1261</u>	<u>0,0691</u>	<u>0,2301</u>	<u>0,0000</u>
No-potability of water used at school	<u>0,4177</u>	<u>0,2348</u>	<u>0,7429</u>	<u>0,0030</u>
Absence of garbage cans in schools	<u>0,1998</u>	<u>0,1291</u>	<u>0,3092</u>	<u>0,0000</u>
Absence of salubrity days	<u>0,3513</u>	<u>0,2311</u>	<u>0,5340</u>	<u>0,0000</u>
Bad conditions of latrine	<u>0,3763</u>	<u>0,2419</u>	<u>0,5854</u>	<u>0,0000</u>
No hand washing with soap before eating food at school	<u>0,2028</u>	<u>0,1291</u>	<u>0,3187</u>	<u>0,0000</u>
No participation in the cleaning and maintenance of the school	<u>0,1856</u>	<u>0,0985</u>	<u>0,3495</u>	<u>0,0000</u>
Lack of lessons at school on hygiene and sanitation	<u>0,0898</u>	<u>0,0286</u>	<u>0,2818</u>	<u>0,0000</u>
Bad quality of urinal	<u>0,2924</u>	<u>0,1087</u>	<u>0,7864</u>	<u>0,0149</u>
Absence of urinals in schools	<u>0,3311</u>	<u>0,2063</u>	<u>0,5313</u>	<u>0,0000</u>
No separation of girls 'and boys' latrines	<u>0,4715</u>	<u>0,2998</u>	<u>0,7414</u>	<u>0,0011</u>
Ignorance of the danger of poor hygiene and basic sanitation at school	<u>0,1725</u>	<u>0,0988</u>	<u>0,3011</u>	<u>0,0000</u>
The bad building of latrines	<u>0,2678</u>	<u>0,1568</u>	<u>0,4573</u>	<u>0,0000</u>
No hand washing with soap after toilet	<u>0,0671</u>	<u>0,0341</u>	<u>0,1322</u>	<u>0,0000</u>
Constant	*	*	*	<u>0,0000</u>

After multivariate analysis, we found that the poor and/or lack of hygiene and sanitation practices in school environments is significantly associated with different factors such as: lack of access to water in the establishment, lack of handwashing kits, non-drinkability of water used at school, absence of garbage cans in school environments, the absence of Celebrity days, the no-washing of hands with soap before consuming food at school, the no-participation in the cleaning and maintenance of the school, the absence of lessons at school on hygiene and sanitation, the absence of urinals in some schools and the poor quality of urinals, the non-separation of latrines girls and boys, ignorance of the dangers of lack of hygiene and basic sanitation at school, poor construction of latrines, and non-washing of hands with soap after toilet ( $p < 0.05$ ).

## 4 DISCUSSION

### 4.1 THE PRACTICE OF HYGIENE AND SANITATION IN SCHOOLS

In this study, we found that the level of hygiene and sanitation practice in schools in the Nkafu neighborhood in Kadutu Health Zone was 46.4%. "Similarly for the leaders of some schools during our various conversations, they had felt that they carried out activities related to hygiene and sanitation in their respective schools but has a reliable frequency." These results are closer to those found by Serge in secondary schools in Bangui [9]. As well as Béatrice Tournonnias, Mélanie Ceran, and al. (2019) who find the same results found in the city of Zinder (Niger) [11]. It is good to show that among the factors that exert

the most influence on the quality of the environment is, among others, sanitation and hygiene at the individual and collective levels. Indeed, sanitation and hygiene are essential to the lives of human beings [12].

#### **4.2 FACTORS ASSOCIATED WITH HYGIENE AND SANITATION IN SCHOOLS**

After our field investigations, we found that the low level of hygiene and sanitation practices in schools is significantly associated with lack of access to water and no-potability of water used at school by schools ( $p < 0.05$ ). This is in line with the statements of school officials *"The authorities of the schools surveyed have shown that they do not have access to water in their respective schools in most cases and they do not have taps within their schools. They said they also use tap water for consumption."* If OMS has stressed the importance of regulating water, sanitation and hygiene parameters in schools [13], it is shown that research will need to focus on improving the epidemiological quality of studies to isolate the effects of water and sanitation in schools [13]. In the study, it was noted that this low practice of hygiene and sanitation measures in schools is linked to the lack of handwashing kits in several schools ( $p < 0.05$ ). This is in line with Serge in his study, which showed that many schools surveyed in the city of Bangui do not have shovels, rakes, wheelbarrows, plastic bins for classrooms, or garbage bins; even the broom that seems to be the least of things does not exist in some classrooms [10].

The absence of toilets in schools and the absence of health days were significantly linked to the low practice of hygiene and sanitation measures in schools ( $p < 0.05$ ), however, *"the majority of schools in the Nkafu district have garbage cans to manage their waste, although health days for example in Salongo, sweeping, cleaning of the schoolyard are organized in some schools, other schools do not organize it."* said the heads of the schools concerned. Similarly in a similar study, we find, the author found the heads of the schools met had claimed that his latrines are at least cleaned regularly, some once a day, other 2 times a week and some in special circumstances such as the presence of excreta at the defecation hole. 81.8% of latrines are cleaned at least once a day, 9% of latrines are cleaned at least twice a week, and 9% in special circumstances [10]. The World Health Organization points out that dust and mold can cause respiratory diseases, asthma attacks and allergies. School premises must therefore be regularly and properly cleaned in order to preserve the health of the occupants [14]. Hence a responsible awareness in hygiene and sanitation is of great importance at the school levels.

We also found a significant influence between poor practice of hygiene and sanitation measures and non-washing of hands with soap before consuming food at school, non-participation in school cleaning and maintenance ( $p < 0.05$ ).

In this study, the absence of lessons in school on hygiene and sanitation, the absence of urinals in some schools and the poor quality of urinals, the non-separation of latrines girls and boys, ignorance of the dangers of lack of hygiene and basic sanitation at school, poor construction of latrines, and non-washing of hands with soap after toilet ( $p < 0.05$ ). This would further expose students and teachers to diseases of dirty hands. Diseases linked to unsafe water, lack of sanitation and poor hygiene represent a huge burden for developing countries. It is estimated that 88% of diarrhea diseases are due to the use of unsafe water and problems of sanitation and hygiene [15]. Many schools are located in communities where there is a high prevalence of diseases due to unsafe water consumption, lack of sanitation and hygiene, and where child-uvian malnutrition and other underlying health problems are common [16]. To determine the environmental factors that influence the state of health of students, the logistic regression model "Logit" was used, it appears from the analyses that the state of health of schoolchildren is explained at 62% by the following variables: the number of body washes per day, the cleaning of toilets, the number of tooth brushing per day, the health monitoring of women restaurateurs and the existence of drinking water facilities. These results are similar to those found in northeastern Benin that also seemed to most determine the health status of schoolchildren in northeastern Benin [17].

## **5 CONCLUSION**

In sum, we found that the level of practice of hygiene and sanitation measures in schools is low in Kadutu Health Zone in Nkafu quater. This weakness would be significantly associated with the lack of access to water in the school, the lack of handwashing kits, the non-potability of the water used at school, the absence of garbage cans in school environments, the absence of health days, the non-washing of hands with soap before consuming food at school, non-participation in school cleaning and maintenance, lack of school lessons on hygiene and sanitation, absence of urinals in some schools and poor quality of urinals, non-separation of girls and boys latrines, ignorance of the dangers of lack of hygiene and basic sanitation at school, poor construction of latrines, and non-washing of hands with soap after toilet ( $p < 0.05$ ).

## RECOMMENDATION

In view of the results found, the involvement of all stakeholders in the education and promotion of the Congolese elite and the world in this field is of great importance in the promotion of health in schools.

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