Infection Prevention And Control: Monitoring And Evaluation Of Hand Hygiene Knowledge, Attitudes And Practices Of 03 Categories Of Students At The Félix Houphouet-Boigny De Cocody University (Abidjan - Cote D'ivoire)

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Abstract

Introduction: Hygiene promotion refers to differentstrategiesthataim to improve the hygiene practices of a group of people in order to prevent the spread of disease

Objective: The knowledge, attitudes and practices in hand hygiene of students at the Félix HOUPHOUËT-BOIGNY University in Cocody need to beimproved as the coverage of good hand hygiene practice isdeclining.

Hand hygiene promotion was conducted to address the lack of knowledge of 03 categories of students at the University Félix HOUPHOUËT-BOIGNY de Cocody.

Methodology and results: A baseline survey was conducted among 989 second and third year university students from 03 streams. Structured questionnaires, group discussions, pre-tests and post-tests wereused to collect data. R software (Versions R*64.3.6.0 and Ri3864.0.0) was used to analyse the data. Students' knowledge, attitudes and practices were assessed by calculating scores. On the basis of score compliance, there was a considerable improvement in the knowledge, attitudes and practice of students in all three student categories. Specifically, there were statistically significant differences between the knowledge, attitudes and practicesscores of the different groups (p-value ≤ 0.05). On the other hand, a significant difference was obtained between the knowledge, attitudes and practices levels of the baseline survey and the second assessment among biology students (□2= 5.19; p-value = 0.022).

Conclusion and potential application of findings: Hand hygiene knowledge, attitudes, and practices improved significantly in all 03 student categories. Transfer of hygiene information and skills to the community was alsonoted. Hand hygiene education could be effectively delivered in the supportive environment provided by the university using affordable and readily available resources. Further efforts should be made to strengthen hygiene education for students in developing countries.

Keywords: Interventions, Knowledge, Attitudes, Practices, Hygiene, Hands, University, Côte d'Ivoire

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Introduction

Hygiene is defined as the set of individual or collective principles and practices aimed at preserving health [1]. It has played an important role, particularly in the prevention of infectious diseases for centuries, mainly in developed countries [2], [3]. However, the advent of vaccines and antibioticsmay have led to a relaxation of individual attention to hygiene, especially hand hygiene [4], [5]. Nevertheless, the link between hand hygiene and the spread of disease has been established. Indeed, hands are real highways for microbes [6], [7].

They carry faecal germs from toilets or defecation sites to utensils, water and food [8]. Hands are man's grasping tool and are used to interact with his environment. This external environment ispopulated by a diverse flora, but also by dirt and toxic elements. Having come into contact and colonized by germs, the hands participate in carrying these germs, which are at the root of hand-borne pathologies.

In developing countries these diseases represent a huge burden [9]. They affect people who do not have access to basic sanitation and hygiene services [10], [11]. Indeed, a precarious environmentis one of the causes of the spread of diseases [11].These pathologies are often the cause of high absenteeism among pupils and students.

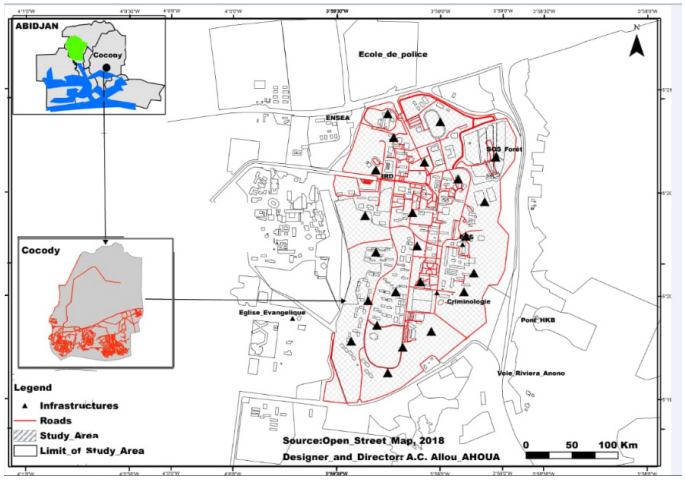
This often leads to a drop in their academic performance [12]. Hand hygiene remains the corner stone to prevent these pathologies. It is the most effective general precaution in infection control [6], [13].

In Cote d'Ivoire, following the example of other developing countries, the rate of compliance with good hand hygiene practices is low in most cases [14] with very little data available on experiments carried out [15].

At the University Félix HOUPHOUËT-BOIGNY, according to the activity report of the community-based health centre (Regional Centre for University Works Abidjan 1), the presence of manually-transported pathologies such as ascariasis, giardiasis, hook worm, typhoid fever are rampant [16]. In addition, several recent studies [17], [18], [19] have shown the inadequacy of good hygiene practices, especially hand hygiene. To correct the inadequacies observed during these various studies, an

information and awareness campaign was initiated. This campaign is part of the university health programme. It fills the gap in good hand hygiene practices in the university environment.

The general objective of this mission is to promote good hand hygiene practices in the university environment in order to contribute to the reduction of hand pathologies registered at the Regional Centre for University Works (CROU-A1).In order to achieve this general objective, 03 specific objectives are listed :



To strengthen the knowledge, attitudes and practices of at least 3,000 people in the academic community on hand hygiene;

- To improve access to hand washing facilities for this target population ;
- To ensure the monitoring-evaluation of hand hygiene practices of this population.

Study Area

The study was carried out at the University Félix Houphouët-Boigny de Cocody in the district of Abidjan (Côte d'Ivoire). This is the first and main university in Côte d'Ivoire (Figure 1). It is a university with a capacity of 30,000 students. It is located between 5° 20 and 5° 38 North latitude and 3° 58 and 3° 59 West longitude. It has more than 60,000 students, according to the 2017 census [20]. Demographics are growing rapidly. The majority of the study population is made up of students from all faculties using the university toilets.

Figure 1 - Study Area

3. Survey methodology

3.1 Selection of the study population

The choice of study populations was based on the students' object of study. For this purpose, 03 categories were identified. These are students with human subjects, students with animal subjects and students with no affinity.

3.2. Method

The evaluation of the students' knowledge, attitudes and practices of hand hygiene wasdonethrough a questionnaire. This questionnaire wastested and validated at the Université de Moncton for the evaluation of students' knowledge and practices. It was modified and tested by a Master 1 student during histhesis before being launched on a large scale at the Felix HOUPHOUET-BOIGNY University. The questionnaire covers the main themes concerning general hygiene : knowledge of hand hygiene, knowledge of hand washing procedures and self-assessment of hygienic behaviour. It was critically read by two doctors who were not part of the survey and was validated by a statistician from NSSAE(National School of Statistics and Applied Economics). It consists of 4 parts. The first part concerns the individual surveyed: hislevel of education, nationality, age, sex, ethnicity, religion, and place of residence. The second part concerns the knowledge of hand hygiene at the university. Six questions concern this section. The respond entis asked whether he or she frequents the university toilets, whether there are mixed toilets, whether the toilets are cleaned regularly, what equipment and materials are available to him or her for hand washing: presence of a wash basin in the toilets, type of soap used, use of hydroalcoholic gel, materials for wiping hands, wastebasket. Question 8 asks the respondent about his or herdaily practice. It is very precise: "Where do you go to have a bowel movement at the university? A third part consists of 21 questions on knowledge of procedures. The expected answers are yes or no. They concern hand hygiene, use of hand sanitizer, sneezing in public places and general presence of bacteria. Finally, the fourth part concerns the self-assessment of the students' hygienic behaviour and the importance theyattach to different behaviours. The baselin esurvey took place from April 2016 to September 2017. Three (03) training and research units (TRU) have been selected for the occasion, they are the students of the faculties of the Faculty of Medicine, the students of CBG (TRU Biosciences) and the students of the TRULanguages Literature and Civilization (Modern Letters). A sample of all second and third year students was interviewed. To do so, we listed the selected students. Then, on the basis of their numbers, individual questionnaire sheets were printed. After a

presentation of the subject of the survey, a copy of the questionnaire was given to the volunteer after a list was asigned (Figure 2).

Baseline survey of the selected population of the University Félix HOUPHOUET-BOIGNY
• Medicine
• Biology
• Modern Letters

Each volunteer completed the questionnaire "anonymously", sometimes asking for help in understanding certain items. The participants are those who have given their verbal and written agreement. It should be noted that the study took place during the break so as not to interfere with class hours. The sign-in list and the corresponding number of cards were given to the delegate. The delegate was responsible for retrieving the questionnaire forms from each student volunteer. The forms were received by the delegate after 48 hours, after a second sign-off. The first survey and the second evaluation survey were carried out respectively from 14 April to 15 August 2018 and from September to December 2019 including a period of 03 months of awareness on average.

3.3. Data analysis and exploitation

For the analysis and interpretation of the results on knowledge, attitudes and practices, a scoring system was categorized according to Table 1. The interpretation was done in a three-step process of adding up each participant's points, determining the level of knowledge, attitudes and practices attributed to each individual using the total score from Step 1, and identifying strengths and weaknesses and making recommendations. To do this, the questions were grouped according to the different chapters knowledge, attitude and practice. For each target group surveyed, the percentage of correct answers made it possible to classifyit in the score griddevelopedabove, rangingfrom 0 to 100. The first evaluation and the second evaluation were carried out after a period of cohort sensitization where the second sensitization was carried out with the support and collaboration of the DGDHP (Deputy General Directorate of Public Hygiene) and the DPHHE (Directorate of Public Hygiene, Health and Environment).The R software (Versions R*64.3.6.0 and Ri3864.0.0) allowed the analysis of the data. Descriptive data were compiled and further analyse dusing the KHI-DEUX (X2) test, used to identify statistically significant differences in the variables. The tests were significant for p-value < 0.05. ArcGis 10.2 software was used for storage, display and map generation.

Table 1. Percentage score by level of knowledge, attitudes and practices

Total Score (Range of values)	Hygiene levels
0 – 24	Inadequate
24 – 49	Basic (basic)
50 – 74	Intermediary
75 – 100	Advanced

3.4. Ethicalconsiderations

In order to carry out this initiated study, letters of information and requests for support and collaboration were sent to the various target institutions. The scientific agreement of the scientific authorities was obtained through the Vice-President in charge of scientific research. The support and collaboration of the MHPH (Ministry of Health and Public Hygiene) was obtained, which has the support of different structures such as DGDPH (Deputy General Directorate in charge of Public Hygiene, DPHEH (Directorate of Public Hygiene Environmental Health) and DHH (Directorate of Hospital Hygiene). In addition, during the survey, the subjects were reassured about the anonymity of the responses, the benefits of the study, and the confidentiality of the information collected.

RESULTATS

4.3. Demographiccharacteristics of the study population

The studyinvolved 03 Training and ResearchUnits (TRU). These are the TRU Biosciences, the TRU of Medical Sciences and the TRU of Languages Literature and Civilization(Modern Letter). In the basic survey, 989 individuals from the TRU Biosciences (333), the TRULLC (459) and the TRU of Medical Sciences (197) were questioned on good hygiene practices, particularly hand hygiene, of which 293 (29.63%) werefemale [95% CI 0.62 - 0.70] and 696 (70.37%) male [95% CI 0.62 - 0.70]. Age groups 18 to 22 and 23 to 26 years old constitute the majority proportions with respectively 48.43% and 46.11% of the study population. The meanage of the participants was 23 ± 6 years (Table 2). Participation in the base line survey in the last evaluation showed 02 patterns of change (Figure 3). In the majority of cases, a reduction in participants was observed from the first follow-up survey. In contrast to the Biosciences and Medical Sciences FRUs, participation showed a bell-shaped evolution at the level of the Languages, Literature and CivilizationTRU. The second evaluation was attended by 806 participants, 227 of whom were female [0.62 - 0.70] and 579 male [0.62 - 0.70]. The participation of males was significantly higher than that of females (□2=110 ;p-value = 0.0000).

5.2. Practice of hand hygiene for the students of the University Felix HOUPHOUET-BOIGNY

The questionnaire administered to individuals who participated in the surveys was used to

Variable		Baseline Surveyn (%)	Evaluation 1	Evaluation 2
			n (%)	n (%)
Sex	Male	696 (70.37)	715 (71.28)	579 (71.83)
	Female	293 (29.63)	288 (28.72)	227 (28.16)
Nationality	Ivorian	961 (97.17)	978 (97.50)	780 (96.77)
	Burkina Faso	13 (1.31)	12 (1.19)	12 (1.48)
	Beninese	9 (0.9)	8 (0.8)	6 (0.74)
	American	4 (0.4)	2 (0.19)	4 (0.49)
	Malian	2 (0.2)	2 (0.19)	2 (0.24)
	Nd	_	_	2 (0.24)
UFR	Biosciences	333 (33.67)	320 (31.90)	278 (34.49)
	Medicine	197 (19.92)	183 (18.24)	139 (17.24)
	Modern Letters	459 (46.41)	500 (49.85)	389 (48.26)
Age range	18 - 22 yearsold	479 (48.43)	275 (27.41)	170 (21.09)
	23 - 26 yearsold	456 (46.11)	648 (64.60)	517 (64.14)

Calculate knowledge, attitude and practice (KAP) scores for hand hygiene and to make the following recommendations the state of the art on socio-sanitary factors related to sanitation at Félix University FELIX HOUPHOUET-BOIGNY. In general, the population's hand hygiene KAP score was generally basic during the base line survey.

Table 2. Characteristics of the study population

	18 - 22 yearsold	479 (48.43)	275 (27.41)	170 (21.09)
Age range	23 - 26 yearsold	456 (46.11)	648 (64.60)	517 (64.14)
	27 - 31 years	54 (5.46)	80 (07.97)	119 (14.76)
	Christian	759 (76.74)	777 (77.46)	623 (77.29)
Religion	Muslim	174 (17.60)	143 (14.25)	140 (17.36)
	Animists	2 (0.2)	2 (0.19)	2 (0.24)
	None	57 (5.76)	55 (5.48)	41 (5.08)
Total		**989 (100)**	**1003 (100)**	**806 (100)**

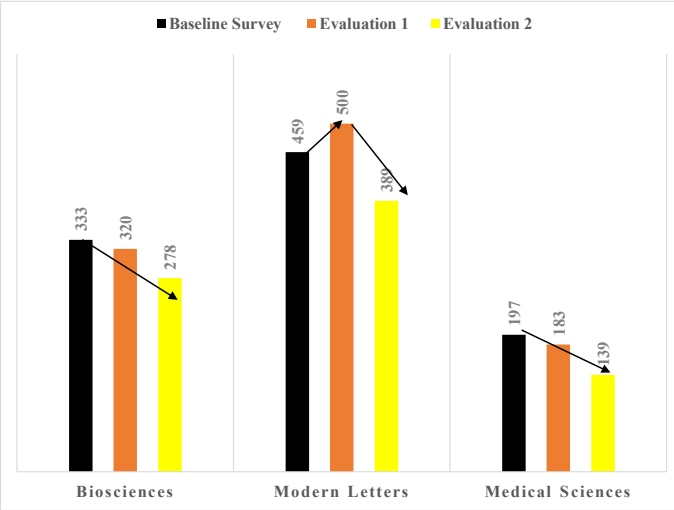


Figure 4: Profile of Participation in Student Questionnaire Surveys by Training and Research Unit

At the level of the first assessment, basic hand hygiene KAP scores were also observed from a general point of view. The students of the Medical Sciences TRU obtained intermediate KAP scores in hand hygiene with 33.88% and basic KAP scores in hand hygiene of 6.01%. A slightimprovement in hand hygiene KAP scores was reported in the entire survey population at the first assessment. No significant difference was observed between hand hygiene KAP scores in the base line survey and those in the first assessment survey (p-value ≥.0.05). The second assessment showed an unsatisfactory improvement compared to the first assessment. At the level of the students of the TRU Biosciences, 42.09% in KAP scores of intermediate level were obtained. Then at the level of Medical Sciences students, we have 17.98% in KAP scores of intermediate level hand hygiene. Finally, 22.88% KAP scores in intermediate level hand hygiene were obtained among TRU Languages Literature and Civilization students (Table 3). A statistically significant difference was obtained between the KAP scores of the baseline survey and the second assessment (p-value =0.00000).

Latrines are the only WASH facilities in the entire university area. The majority of those surveyed said that they regularly use the toilets.

Open defecation was reported throughout the study and was more pronounced in the second assessment (Table 4).

In the basic survey, 1.20% of students of Languages, Literatures and Civilizations reported defecating in the open air, compared to 5.2% and 2.43% respectively in the first and second assessments. Moreover, there was no statistically significant difference between the number of individuals in the baseline survey and the first evaluation (□2=0.001 ;p-value = 0.998). In the whole study population, individuals whore ported defecating in the open were 4.80%, 11.20% and 21.40% respectively in the baseline survey, the first and second assessments. There was a statistically significant difference between the number of individuals whore ported defecating in the open between the base linesurvey and the first assessment (□2=9.01 ;p-value = 0.0027).

5.3. Comparative study of the differentevaluations

The analysis of the different KAP scores obtained during the assessments at the Félix HOUPHOUËT-BOIGNY University was carried out (Figure 5). No significant difference was obtained between the KAP levels of the baseline survey and that of the first evaluation(p-value=0.120), however, specifically, statistically significant differences were noted between the KAP scores of the different groups (p-value ≤ 0.05). On the other hand, a significant difference was obtained between the KAP levels of the baseline survey and the second assessment among biological science students, (□2= 5.19; p-value = 0.022).

Table 3: Hand Hygiene Practice Survey Scores

Training and Research Units(TRU))	**Score (%)**	**Categorys**	**Baseline Survey**			**First evaluation**			**Second evaluation**		
			N	**n**	**(%)**	**N**	**n**	**(%)**	**N**	**n**	**(%)**
Biosciences	**0 – 24**	Inadequate	333	62	**18.6**	320	45	**14.1**	278	30	**10.8**
	25-49	Basic	333	247	**74.2**	320	197	**61.6**	278	123	**44.24**
	50-74	Intermediary	333	24	**7.21**	320	78	**24.4**	278	117	**42.09**
	75-100	Advanced	333	0	**0**	320	0	**0**	278	8	**2.87**
Medical Sciences	**0 – 24**	Inadequate	197	8	**4.06**	183	5	**2.73**	139	4	**2.88**
	25-49	Basic	197	125	**63.5**	183	105	**57.4**	139	96	**69.06**
	50-74	Intermediary	197	56	**28.4**	183	62	**33.9**	139	25	**17.98**
	75 - 100	Advanced	197	8	**4.06**	183	11	**6.01**	139	14	**10.07**
Modern Letters	**0 – 24**	Inadequate	459	112	**24.4**	500	105	**21**	389	84	**21.6**
	25-49	Basic	459	334	**75**	500	386	**77.2**	389	212	**54.5**
	50-74	Intermediary	459	3	**0.65**	500	9	**1.8**	389	89	**22.88**
	75 - 100	Advanced	459	0	**0**	500	0	**0**	389	4	**1.02**

Table 4: Hygiene practices of surveyed students

	Medical Sciences			Biosciences			Modern Letters		
	Sample n (%)			Sample n (%)			Sample n (%)		
	EVA_B	**EVA_1**	**EVA_2**	**EVA_B**	**EVA_1**	**EVA_2**	**EVA_B**	**EVA_1**	**EVA_2**
Sex									
Male	125 (63.45)	137 (74.86)	97 (69.78)	243(72 .97)	260(81 .25)	207(74 .46)	328 (71.46)	378 (75.6)	294 (79.67)
Female	72 (36.54)	46 (21.13)	42 (30.21)	90 (27.02)	60 (18.75)	71 (25.53)	131 (28.54)	121 (24.2)	75 (20.32)
Do you use the restroom									
Yes	192 (97.46)	131 (71.58)	139 (100)	439 (95.64)	320 (100)	278 (100)	318 (95.50)	418(8 3.6)	322 (87.26)
No	5 (2.54)	6 (3.27)	0 (0)	20 (4.36)	0 (100)	0 (0)	15 (4.50)	82 (16.4)	47 (12.74)
Are the toiletssufficient?									
Yes	4 (2.03)	0 (0)	0 (0)	1 (0,21)	0 (0)	0 (0)	325 (97.60)	5 (1)	8 (2,16)
No	193(97 .97)	183 (100)	139 (100)	458 (99.79)	320 (100)	278 (100)	8 (2.40)	495 (99)	361 (97.83)
Is thereHygienicequipmentavailable?									
Yes	0 (0)	0 (0)	0 (0)	6 (1.30)	0 (0)	0 (0)	4 (1,20)	0 (0)	0 (0)
No	197 (100)	183 (100)	139 (100)	453(98 .70)	320 (100)	278 (100)	329 (98.80)	500(1 00)	369 (100)
Is there a separatetoilet for men and women ?									
Yes	29 (14.72)	0 (0)	0 (0)	123 (26.80)	4 (1.25)	2 (0.72)	68 (20.42)	3 (0.6)	0 (0)
No	168 (85.28)	183 (100)	139 (100)	336 (73.20)	316(98 .75)	276(99 .28)	265 (79.58)	497 (99.4)	369 (100)
Is the cleaningdoneregularly?									
Yes	25 (12.69)	0 (0)	0 (0)	133 (29.97)	21(6.5 6)	25 (9)	208(6 247)	122 (24.4)	72 (19.51)
No	172 (87.31)	183 (100)	139 (100)	326 (71.03)	319(99 .68)	253 (91)	–	378 (75.6)	297 (80.49)
Are thereany hand washing exciter plugs ?									
Yes	23 (11.67)	0 (0)	123(88 .48)	69 (15.03)	0 (0)	241(86 .7)	63 (13.72)	0 (0)	342 (92.68)
No	174 (88.33)	183 (100)	16 (11.51)	390 (84.97)	320 (100)	37(13. 31)	396 (86.27)	500 (100)	27 (7.31)
How do youfeel about hygiene in the bathroom ?									
Very good	0 (0)	0 (0)	0 (0)	4 (0.88)	1 (0.31)	0 (0)	2 (0.60)	0 (0)	0 (0)
Good	0 (0)	0 (0)	0 (0)	2 (0.43)	1 (0.31)	10 (3.6)	111 (33.34)	101 (20.2)	9 (2.43)
Accept able	26 (13.20)	83 (45.35)	32 (23.02)	102 22.22	24 (7.5)	32(11. 51)	152 (45.64)	227 (45.4)	159 (46.08)
Wrong	121 (61,42)	100 (54.64)	107(76 .97)	134 (29.2)	290(90 .62)	229(82 .37)	67 20.12	149 (29.8)	180 (48.78)
Very bad	50 (25.38)	0 (0)	0 (0)	217 (47.27)	4 (1.25)	7 (2,51)	0 (0)	23 (4.6)	21 (5.7)
How wouldyoucharacterize the universitybathrooms?									
Clean	105 (53.30)	83(45. 35)	92(66. 19)	226 67.86	198(61 .88)	201(72 ,30)	196 (42,70)	180(3 6)	154(41 ,74)
Sales	92 (46.70)	100(54 .65)	47(33. 81)	107 (32.13)	122(38 .12)	77(37, 70)	263 (57,30)	320(6 4)	(58,26)
Where do you go in the saddle ?									
Toilets	194 (98.47)	142(77 .2)	96(69. 06)	370 (80.61)	290(90 .62)	198(71 .22)	254 (76.27)	403 (80.6)	187 (50.68)
Bush	0 (0)	05(2.7 3)	03 (2.15)	0 (0)	03 (0.93)	11 (3.95)	4 (1.20)	26 (5.2)	9 (2.43)
Toilets / Bush	3 (1.53)	36(19. 67)	40(28. 77)	89 (19.39)	67(20. 93)	69 (24.82)	75 (22.53)	71 (14.2)	73 (19.78)
Where do youurinate?									
Toilet	181 (91.88)	123(67 .21)	85(61. 15)	135 (29.41)	180(56 .25)	152(54 .67)	206 (61.87)	389 (77.8)	259 (70.2)
Bush	3 (1.52)	8 (4.37)	7 (5.03)	37 (8.06)	29 (9.06)	13 (4.67)	16 (4.80)	56 (11.2)	79 (21.40)
Toilets / Bush	13 (6.60)	52(28. 41)	47(33. 81)	287 (62.53)	111(34 .68)	113(40 .67)	243 (52.29)	55 (11)	31 (8.4)

EVA_B:Baseline survey; EVA_1: First evaluation; EVA_2: Second evaluation

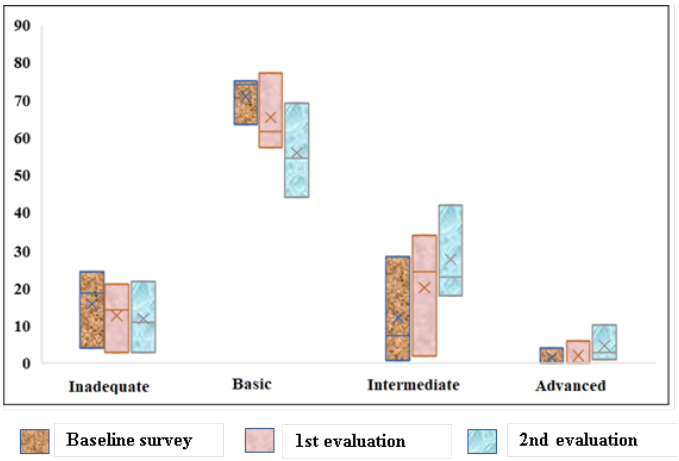


Figure 5 : Comparative study of the differentevaluations

DISCUSSION

According to the Center for Disease Control and prevention [21], hand hygiene is ranked in the first category of infection control recommendations. It is a simple but effective and critical weapon in preventing the transmission of agents [21] [22] [23].

The results of the student hand hygiene KAP assessment revealed basic CAP scores in all individuals surveyed. These results couldb eexplained by the hetero geneity of the individuals interviewed at eachassessment, it should be noted that at eachassessment a group of individuals was included in the study. The results of the second assessment were more conclusive than those of the first assessment when considering the evolution of hand hygiene KAP scores according to the groups studied. This could explain the importance of the second sensitisation which was supported by the DPHHE (Directorate of Public Hygiene and Health-Environment) and the DDGPH (Deputy Directorate General of Public Hygiene). The students interviewed reportedusing the university toilets. Nevertheless, the number of students who reported using the toilets gradually decreased from the first evaluation to the second evaluation. This decrease in the use of university toilets by students could be explained by the reduced number of WASH facilities and the in accessibility of these WASH facilities, leading students to the Open Air Defecation and eliminate their urine in the open air. This could explain the increase in the number of gastrointestinal ailments recorded in the health community centre obtained by N'gbesso and colleagues [24]. This is facilitated by the close contact of people with each other through direct or indirect transmission through the environment [25] [26] [27]. From the same perspective, several studies have shown that the simple

means of prevention against gastroenteric diseasesis appropriate hygiene and sanitation [28] [29] [30]. A study conducted in Brazil showed the impact of implementing a large sanitation measure:before the intervention the risk of diarrhoea due to poor sanitation and infrastructure was 53%, this risk increased to 18% after the intervention [31]. Access to water, hygiene and sanitation is fundamental to health. It plays a criticalrole in the prevention and management of diseases, especially diarrhoeal diseases. It is one of five public health interventions recommended for the control of neglected tropical diseases [32] [33] [34].

Difficulties and limitations of the study

Difficulties of study were the unavailability of students for the realization of awareness, insertion and exit from study of some students. The insertion and exit from the study of certain students and the lack of funding were the limitations of the study that did not make it possible to really assess the impact of awareness raising.

CONCLUSION

The assessment of the hand hygiene knowledge, attitudes and practices (KAP) of the individualssurveyedshowed basic hygiene behavior, attitudes and practices in the study population during the 02 assessments. Scores in hygiene knowledge, attitudes, and practices wereloweramonghealth personnel and students in the Language, Literature, and Civilization training and researchunits. The second sensitizationhad a greater impact compared to the first assessment.

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