

HAND HYGIENE IN A UNIVERSITY ENVIRONMENT: The Case of Felix Houphouët-Boigny's University (Abidjan, Ivory- Coast)

N'gbesso N. Jean-Paul¹, N'guessan A. Nicaise², Doumbia M. Cissé³, N'dri K. Felix⁴

Phd Student, Laboratories of Zoology and Animal Biology, Félix Houphouët-Boigny University, 22 B.P. 582,
Abidjan 22, Ivory Coast¹

Doctor (Lecturer), Laboratories of Zoology and Animal Biology, Félix Houphouët-Boigny University, 22 B.P. 582, Abidjan 22,
Ivory Coast²

Doctor, MSHP / DGS / Deputy Director General for Public Hygiene, 14 BP 741 Abidjan 14, Ivory Coast³

Phd student, University center of Research and Application in Remote Sensing, Félix Houphouët-Boigny
University, Abidjan, Ivory Coast⁴

ABSTRACT: The lack of water, sanitation and hygiene (WASH) is one of the factors of propagation of many diseases in Africa particularly in Ivory Coast. Hand hygiene remains the essential measure of reduction of pathologies, particularly hand-borne infections. The purpose of this study is to evaluate the hygienic behavior of the university population through the observance of eighteen (18) toilets. The study was carried out in an academic environment with 5, 687 people who attended the university toilets and ran from October 27 to November 30, 2016. The results of this evaluation revealed that the hand hygiene in a university environment is not practiced. As a result of this study, the need for an awareness campaign on hand hygiene in a university environment seems sensible and useful for the adoption of behavioral habits conducive to health.

KEYWORDS: Hygiene - hand - university – Ivory-Coast.

I.INTRODUCTION

Hand hygiene plays an important role in the prevention of pathologies especially those transmitted by the hands [1] [2] [3] [4] [5]. These pathologies are common, particularly in developing countries where inadequate drinking water, poor hygiene and basic sanitation are accentuated [3] [5] [6] [7] [8]. They are the causes of absenteeism at school and work, and therefore of a low educational level, economic losses and significant incomes at the scale of a developing country [3] [9] [10]. They represent a huge burden for these countries. It is estimated that more than 1.9 billion school days are lost per year in developing countries when the Water, Sanitation and Hygiene (WASH) goals are not achieved [11] [12]. Indeed, the physical environment and the degree of cleanliness of the training structures have implications for the health and well-being of learners. In the case where this environment does not have sufficient water supply infrastructure, washbasin and toilets in good condition, the diseases develop and spread rapidly and it becomes a high-risk space for its last ones, by increasing their vulnerability to disease [12].

Access and practice of water, sanitation and hygiene (WASH) services are generally associated with a reduction in neglected tropical diseases [13] [14] [15]. Their success in disease control has been demonstrated [16]. Access to basic water and sanitation is considered a human right [17] [18].

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 7, Issue 4, April 2018

Hand hygiene in educational settings is not progressing enough. Significant progress remains to be made in achieving an acceptable compliance rate for hand hygiene[19]. The present study was born from this observation. Its goal is to promote hand hygiene in academia and to propose relevant recommendations that will contribute to the achievement of Goal 6 of Sustainable Development in its target 2 by 2030; is committed to promoting access to adequate and equitable hygiene conditions for all.

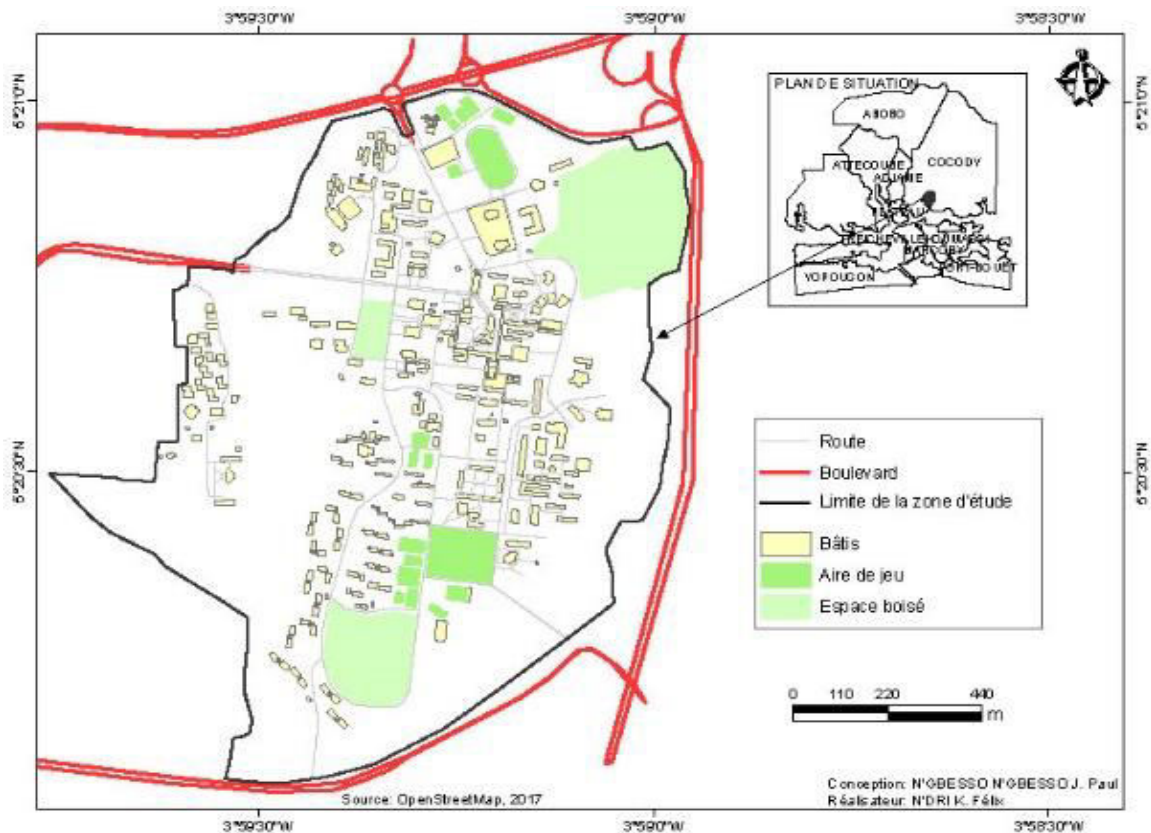


Fig.1: Study site

II.MATERIALS AND METHODS

The study was conducted at the Felix Houphouët-Boigny University of Cocody in the health district of Abidjan (Ivory Coast). It is the first and the main university of Ivory-Cost (Fig.1). It is a University with a capacity of 30,000 students. It is between 5 ° 20 and 5 ° 38North latitude and 3 ° 58 and 3 ° 59 west longitude. It has more than 41,000 students, according to the 2017 census [20]. This student population is very growing. The participants in the study consist mainly of students from all faculties attending the University toilets.

Direct observations of hands hygiene behaviors were conducted in 18 bathrooms ofFelix Houphouët-Boigny University of Cocody (Abidjan). The results from the observation were obtained in a discrete manner. All observations were recorded according to a standard coding form. The form of the coding consisted of the subject's identifier, the date, the observation time, the type, and thehands hygiene behaviors. The hand hygiene behaviors were recorded in four categories: no hand washing (Use of the toilet without washing the hands), wetting of hands without soap, washinghands with soap and use of a hydro-alcoholic gel. The total duration of washing hands was discreetly calculated based on the number of seconds that the subject's hands were placed under running water duringthe hands

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 7, Issue 4, April 2018

washing. The observation time was collected and the nominal time categories were conducted at the end of analysis. The group age of subject has not been mentioned because of the discrete manner of our observation. The R version 3.3.3 software allowed the analysis of the data. The descriptive data was further compiled and analyzed using the KR-KR-KR-TWO (X^2) test and the KRUSKAL WALLIS K-test. Specifically, the KHI-TWO test (X^2) was used to identify statistically significant differences in subject demographic variables, environmental variables in toilets, and behaviors of hygiene hands. The KRUSKAL WALLIS K test was used to establish average differences in the length of time that hands were placed under running water. The tests were significant for $p < 0.01$.

III. RESULTS AND DISCUSSION

Characteristics of the studied sample

Table 1 presents the characteristics of the sample and the observation parameters. On a staff of five thousand six hundred twenty-seven (5,687) subjects observed, approximately four thousand two hundred and thirty-two (4,232) of the observations were made in the morning, followed by afternoon and evening with nine hundred and three (903) and five hundred and fifty-two (552) respectively. All toilets did not have a hand drying mechanism and did not show signs of encouraging washing hands. They were equipped with a standard faucet and had almost no soap and paper towel.

Table 1: Characteristics of the studied population

Variables	Cut sample	Percentage (%) 95% CI
Observation time		
Morning	4,232	74.42 [0.732, 0.755]
Afternoon	903	15.88 [0.149, 0.168]
Evening	552	9.70 [0.089, 0.104]
Sex		
Male	3,822	67.20 [0.315, 0.340]
Female	1,865	32.80 [0.659, 0.684]
Profession		
Students	5,664	99.60 [0.993, 0.997]
Other	23	0.40 [0.002, 0.006]
Total	5,687	100

Behavior of hygiene hands and the average time of washing of hands

Overall, four thousand five hundred and twenty (4,520) individuals, or 79.48%, did not wash their hands at the exit of the toilets, one thousand one hundred and fifty-six (1,156) representing 20.32% attempted to wash themselves hands, it means that they wetted their hands at the exit of the toilet, two or 0.04% used water add soap and four (4) grouping 0.16% individuals used hydro alcoholic gel (Table 2).

In terms of handwashing duration, we observed that 4,529 (79.64%) of the subjects performed no time under running water, 541 (9.52%) performed 1 to 4 seconds, 457 (8.03%) performed 5 to 8 seconds, 9 to 14 seconds performed by 128 individuals, and 32 (0.56%) performed 15 seconds or more.

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 7, Issue 4, April 2018

Table 2: Distribution of observed individuals according to the hands hygiene behavior and the hand washing time

Variables	Cut sample	Percentage (%) 95% CI
Hand hygiene behavior		
No washing	4,520	79.48 [0.784, 0.805]
Rinsing	1,156	20.32 [0.192, 0.213]
Water + soap	2	0.04 [0.000, 0.001]
Gel	9	0.16 [0.000, 0.002]
Hand washing time		
0 second	4,529	79.64 [0.785, 0.806]
1 – 4 seconds	541	9.52 [0.087, 0.102]
5 – 8 seconds	457	8.03 [0.073, 0.087]
9 – 14 seconds	128	2.25 [0.018, 0.026]
15 seconds and more	32	0.56 [0.003, 0.007]
Total	5,687	100

Comparison of the behavior of hygiene hands and Characteristics of the studied Population

Table 3 reveals statistically significant differences between behavior of hygiene hands, observation time, gender and occupation. An increase in the absence of washing of hands was noted, with the observation time being more pronounced in the morning (80.04%). The absence of washing hands is high in the male (85.16%) than in the female (67.62%). Overall, we note a slight rate of washing hands with a maximum at night (0.36%). A significant difference was confirmed between observation time and behavior of hygiene hands ($X^2 = 22.901$, $p < 0.01$). At the sex level, there was a statistically significant difference between the sex and the behavior of hygiene hands of the subjects ($X^2 = 244.35$, $p < 0.01$).

Table 3: Hand hygiene behavior and of the demographic characteristics

Variables	No washing	Wetting hands without soap	Washing with soap	Use hydro-alcoholic gel	X-squared
Observation time					22.901*
Morning	80.040	19.810	0	0.150	
Afternoon	77.230	22.540	0	0.230	
evening	77.960	21.500	0.360	0.180	
Sex					244.350*
Male	85.160	14.820	0.020	0	
Female	67.620	31.840	0.050	0.480	
Profession					5.962
Students	79.700	20.100	0.030	0.160	
Other	0	100	0	0	

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 7, Issue 4, April 2018

*p<0.01

Comparison of the hand washing time means by observation time, sex, occupation and handhygiene behavior

The Kruskal-Wallis test was performed to evaluate the average differences between the factors identified in terms that may affect the length of the duration of washing (Table 4). Statistically significant differences were found for gender, occupation and hygiene behavior. The averagetime of washing hands for men and women, although short for both, was 0.663 seconds for men and 1.995 seconds for women.

Table 4: Hand washing time mean and the demographic characteristics

Variables	Hand washing time mean (seconds)	Kruskal-Wallis chi-squared
Observation time		3.469
Morning	1.200	
Afternoon	1.075	
Evening	1.126	
Sex		255.980*
Male	0.663	
Female	1.995	
Profession		5.806*
Students	1.105	
Other	0	
Hand hygiene behavior		5592.900*
No washing	0	
Rinsing	5.392	
Water + soap	12.500	
Gel	0.000	

*p < 0.01

Hand hygiene is classified in the first category of the Center for Disease Control and Prevention (CDC) recommendations. It is a simple but effective weapon that is crucial in preventing the prevention of transmission of infectious agents [21][22][23][24][25]. Our study provided detailed information on how long individuals have engaged in various behaviors of hand hygiene. It recognizes the importance of environmental factors that promote correct behaviors of hand washing. According to our knowledge and research, this study was one of the first to focus on behaviorsof hand hygieneand the duration of hand washing inuniversity of Ivory Coast.

It was found that 32 individuals (0.56%) spent at least 15 minutes under running water and according to the Center for Disease Control and Prevention [21], it is recommended to people to rub their hands with soap for at least 15 to 20 seconds before rinsing them thoroughly.

Our study showed that the majority of individuals (99.80%) do not wash their hands in the university environment. This could be explained by the lack of hygienic materials (paper towel, soaps, and disinfectants) in the university toilets.

The behaviors of hand washing observed and the duration of hand washingrelate differently to different factors. The percentages of individuals who washed their hands were significantly higher in women (0.05%) than in men (0.02%). This study supports the work of Johnson andcollaborators at an American university[26]. It corroborates with the study of Thurman and collaborators carried out among students in Dormitories University. In particular, they argue that men need to be more encouraged than women to engage in correct behaviors of washing hands. Our investigations showed a time of day effect on the behavior of washing handsHe showed that washinghands generally decreases during the evening.

This was confirmed by the work of Carl and Collaborators in a study at an American university[27].

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 7, Issue 4, April 2018

The most important results of our research focus on the distinction between behaviors of washing hands and the length of time those hands were washed. Specifically, less than 0.56% of the sample approached the recommended duration of washing hands. In addition, our study found that a large proportion of subjects engaged in behavior of washing hands that did not involve the use of soap.

In sum, it is advisable that the increase in hand hygiene could be induced by keeping sinks clean, by providing hygiene materials and including signs that encourage appropriate behaviors of hand hygiene.

IV. LIMIT OF THE STUDY

The results of this study are instructive, but it should be noted that they are not representative of the entire population, since the observations took place in an academic environment. It should be noted that the study was conducted in such a way as to be as discreet as possible in order to minimize observation errors, several studies have shown that the obvious presence of a person in a toilet could influence the behaviors of washing hands [28][29][30][31].

V. CONCLUSION AND RECOMMENDATIONS

The study focused on the behavior of washing hands in an academic environment. Field observations in a variety of washrooms provided a sample of 5,687 individuals who were discreetly monitored for their hand hygiene behaviors. The students have bad hand hygiene behavior. The time hand washing means for men and women were very short, averaging 0.663 and 1.995 seconds, respectively. Only 0.56% of the sample washed their hands for 15 seconds or more. The public must be continually encouraged to engage in proper practices of washing hands. In addition, special attention to environmental conditions and toilet signage can help increase compliance.

It would be advisable to include hand-drying in future studies, as previous studies have demonstrated a possible transfer of microorganisms from wet skin to dry skin [32][33][34].

REFERENCES

- [1]. SALABERT Delphine, "Doctorate's thesis in general medicine: environment state in a high commune to toward Pierre and Marie Curie University", pp. 18-30, 2008.
- [2]. WHO-UN-Habitat. "The hidden face of towns: update and overcome the inequalities of hearth habitat urban", Report UN-Habitat-OMS, Genève, pp. 98-110, 2010
- [3]. Eau vive, "For a best diffusion of sanitation practices in rural habitat sahélian 80 propositions concretes – mars 2010 Syntheses of study", pp. 9-18, 2010.
- [4]. Freeman M., Clasen T., and R. Dreifelbis, "The impact of a school-based water supply and treatment, hygiene, and sanitation programme on pupil diarrhea: a cluster randomized trial". *Epidemiology and Infection*, Vol.142, pp. 340–351, 2014.
- [5]. OMS, "Water-related diseases, water_sanitation_health/diseases-risks/diseases", pp. 100-114, 2017.
- [6]. IFRC. "International Federation of Red Cross and Red Crescent Societies, The International Federation software tools for long-term water and sanitation programming", pp. 39-45, 2007.
- [7]. Briscoe, J., R.G. Feachem and M. Mujibur Rahaman, "Evaluation of the effect on the health: water supplying, sanitation and hygiene". UNICEF, ICDDR,B, CRDI (research center for international development), Ottawa, Canada, pp. 60-72, 1987.
- [8]. OMS, "Summary of Recommendations of OMS for Hygiene hands during the sanitation- first worldwide challenge for the Patients security: a proper treatment is the most appropriate treatment", pp. 25-32, 2014.
- [9]. A. C. Diallo, "Evaluation of practices hygienic of washing hands by survey, samplings and microbiologic analysis: students 'case and employees of Moncton university, campus of Moncton", MASTER option sciences in-alimentation nutrition, Moncton University, Canada, pp. 14-35, 2015.
- [10]. N'gbesso Jean-Paul N'GBESSO, Nicaise Aya N'GUESSAN, Alexis Loukou BROU, Jean-Romarc ALLOKA, Felix Kouamé N'DRI, Guy Roger GNAZALE, "Evaluation of knowledge, attitude and practices in hygiene hands of students in biological sciences from Felix Houphouët-Boigny University of Cocody (Abidjan-Côte d'Ivoire)", *International Journal of Environmental & Agriculture*, Vol-3, no 8 pp 49–57, 2017.
- [11]. Anonym, "Water, improvement and Hygiene (WASH) in the schools, Manual for kids' friend school, UNICEF". pp. 3-11, 2011.
- [12]. Anonym, "Access to water and sanitation in the school a round Saint Louis area / Senegal. UNICEF", pp.15-29, 2013.
- [13]. Strunz EC, Addiss DG, Stocks ME, Ogdén S, Utzinger J, et al, "Water, Sanitation, Hygiene and Soil-Transmitted Helminth Infection", *A Systematic Review and Meta-Analysis*. *PLoS Med*, Vol.3, no 11, 2014.
- [14]. Gruber JS, Reygadas F, Arnold BF, Ray I, Nelson K, et al, "A stepped wedge, cluster-randomized trial of a household UV-disinfection and safe storage drinking water intervention in rural Baja California Sur, Mexico", *Am J Trop Med Hyg* Vol. 89, pp. 238–245, 2013.
- [15]. Fewtrell L, Kaufmann RB, Kay D, Enanoria W, Haller L, et al, "Water, sanitation, and hygiene interventions to reduce diarrhea in less developed countries: a systematic review and meta-analysis", *Lancet Infect Dis*, Vol.5, pp. 42–52, 2005.

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 7, Issue 4, April 2018

- [16]. Emerson, E., Vick, B., Graham, H., Hatton, C., Llewellyn, G., Madden, R., Rechel, B., J. Robertson, "Disablement and Health. In Nick Watson, Alan Roulstone, Carol Thomas (Eds.), Routledge Handbook of Disability Studies", pp. 253-270, 2012.
- [17]. The PLoS Medicine, "Editors clean water should be recognized as a human right", PLoS Med, Vol.6, no 6, 2009.
- [18]. Luh J, Baum R, and J.Bartram, "Equity in water and sanitation: developing an index to measure progressive realization of the human right", Int J Hyg Environ Health, Vol. 216, pp. 662-671, 2013.
- [19]. MSHP, "Stratégie nationale de promotion de l'hygiène en Côte d'Ivoire, rapport de l'étude diagnostique", pp. 10-15, 2005.
- [20]. UFHB, "University Félix Houphouët-Boigny: www.univ-fhb.edu.ci", accessed 03 January 2017.
- [21]. Centers for Disease Control and Prevention, "Washing hands: Clean hands save lives", pp. 6-27, 2012.
- [22]. Mead, P.S., Slutsker, L., Dietz, V., McCaig, L.F., Bresee, J.S., Shapiro, C., Griffin, P.M., and R. V. Tauxe, "Food related death and illness in the United States", Emerging Infectious Diseases, Vol.5, no 5, pp. 607-625, 1999.
- [23]. Curtis V and Cairns S. cross, "Effect of washing hands with soap on diarrhea risk in the community: a systematic review", The Lancet Infectious Diseases, Vol.3, pp. 275-281, 2003.
- [24]. Rabies T and V. Curtis, "Washing hands and risk of respiratory infections: a quantitative systematic review", Tropical Medicine and International Health, Vol. 11, pp. 258-267, 2006.
- [25]. Aiello AE, Coulborn RM, Perez V and Larson E. L. "Effect of hygiene hands on infectious disease risk in the community setting: a meta-analysis", American Journal of Public Health, Vol.98, pp. 1372-1381, 2008.
- [26]. Johnson, H. D., Sholosky, D., Gabello, K. L., Ragni, R. V., and M. N. Ogonosky, Gender differences in handwashing behavior associated with visual behavior prompts. Perceptual and Motor Skills, Vol.3, no 97, pp. 805- 810, 2003.
- [27]. Carl P. Borchgrevink, JaeMin Cha and SeungHyun Kim, "Hand washing Practices in a College Town Environment", National Environmental Health Association, Vol.8, no 75, pp. 18-24, 2013.
- [28]. Bittner, M., Rich, E., Turner, P., and W. Arnold, "Limited impact of sustained simple feedback based on soap and paper towel consumption on the frequency of washing hands in an adult intensive care unit", Infection Control Hospital Epidemiology, Vol.3, no 23, pp. 120-126, 2002.
- [29]. Drankiewicz, D., and L. Dundes, "Washing hands among female college students", American Journal of Infection Control, Vol.2, no 31, pp. 67-71, 2003.
- [30]. Edwards, D., Monk-Turner, E., Poor man, S., Rushing, M., Warren, S., and J. Willie, "Predictors of behavior of washing hands. Social Behavior and Personality", An International Journal, Vol.8, no 30, pp. 751-756, 2002.
- [31]. Nalbone, P., Lee, K., Suroviak, A., and J. Lennon, "The effects of social norms on male hygiene", Individual Differences Research, Vol.3, no 3, pp. 171-176, 2005.
- [32]. Mackintosh, C., and P. Hoffman, "An extended model for transfer of microorganisms via the hands; differences between organisms and the effect of alcohol disinfection", Journal of Hygiene, Vol.3, no 92, pp. 345-355, 1984.
- [33]. Merry, A., Millder, E., Findon, G., Webster, C., and S. Neff, "Touch contamination levels during anesthetic procedures and their relationship to hand hygiene procedures: A clinical audit", British Journal of Anesthesia, Vol.2, no 87, pp. 291-294, 2001.
- [34]. Patrick, D., Miller, T., and G. Findon, "Residual moisture determines the level of touch-contact associated transfer following washing hands", Epidemiology and Infection, Vol.3, no 119, pp. 319-325, 1997.