

Adherence to Handwashing Procedures: A Comparative Study of Male and Female Students

Olala, Gilbert Owuor

P.O. Box 7068; Kisumu, Kenya.

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ABSTRACT

Many outbreaks of food borne illnesses are traced to unwashed hands. Germs that cause flu, hepatitis A and many kinds of diarrhea can be picked up and spread by hands. Laziness, forgetfulness, lack of time, and competing priorities such as academic activities limits students from participating in handwashing when it is indeed necessary. It is because of this that the study was set to compare adherence in handwashing procedures between male and female students at The Kenya Institute of Management, Kisumu, Kenya. The null hypothesis of the study was, “there is no difference in adherence to handwashing procedures between male and female students.” Descriptive and diagnostic research design was used. The target population was 390 students, which were divided into two strata, males and females from, which a representative sample of 193 was drawn through a randomization process. Data was collected by a questionnaire pretested for validity and reliability to ensure quality control. Collected data was screened and entered into SPSS version 20.0 and analyzed by descriptive statistics and chi square test. Data was presented using frequency tables, pie charts and chi square tables. Five out of six handwashing procedures studied revealed that there is no difference in adherence to handwashing procedures between male and female students. Gender was therefore not an important variable in determining adherence to handwashing procedures among students. The study will be important in expanding wellness through reduction in spread of infectious diseases. This will lead to reduction in: absenteeism from college; upper respiration illnesses; and diarrhea rate in educational institutions. Hands should be washed after visiting toilets to: prevent bacterial infection; eliminate germs that one might have come into contact with while in toilet; remove dirt; remove bad smell from hands; and adhere to recommended health requirements. Handwashing with soap and water should also be encouraged to: kill germs; soften water to make it easy to lather over hands; facilitate rubbing and friction that dislodge dirt; and leave hand smelling pleasantly. Students should be trained on values of good handwashing and consequences of not adhering to proper handwashing procedures. The college should be advised to consistently provided soap and paper towel in toilets so that hygiene may be optimally observed. If soap dispensers are empty, college should make sure they are filled. Paper towels should be kept in hygienic places in order to avoid contamination before use.

Key words: Handwashing, Students

INTRODUCTION

Handwashing and hand hygiene is the act of cleaning ones hands with or

without the use of water or another liquid, or with the use of soap for the purpose of removing soil, dirt, and/or micro-organisms

(www.wikipedia.org/wiki/centers_for_disease_control_and_prevention). The phrase, “washing ones hands of something,” means declaring ones unwillingness to take responsibility for the thing or share complicity to it. In the New Testament, Mathew verse 27:24, an account is given of Pontius Pilate washing his hands off the decision to crucify Jesus. This was when he saw that he could prevail nothing; he took water and washed his hands before the multitude; saying that he was innocent of the blood of a just man.

The medical purpose of handwashing is to cleanse them of pathogens and chemicals, which can cause personal harm or disease. This is particularly important for people who handle foods or work in the medical field; but it is also an important practice for the general public. It is further noted that people can become infected with respiratory illnesses such as influenza or common cold, for example, if they don't wash their hands before touching their eyes, noses or mouths (www.wikipedia.org/wiki/centers_for_disease_control_and_prevention). Indeed, the Center for Disease Control and Prevention (CDC) stated that one of the most important measures for preventing the spread of pathogens is effective handwashing. As a general rule, handwashing protects people, poor or not, from droplets and airborne diseases such as measles, chickenpox, influenza and tuberculosis. It also protects against diseases transmitted through fecal-oral roots.

Purpose of the study

The purpose of the study was to compare adherence to handwashing procedures between male and female students at The Kenya Institute of Management, Kisumu, Kenya.

Hypothesis of the study

H_0 :There is no difference in adherence to handwashing procedures between male and female students.

H_1 :There is a difference in adherence to handwashing procedures between male and female students.

Significance of the study

Hands are viewed as the primary mode of transmission of many infectious diseases, particularly among those living and working in close proximity such as college students. Best handwashing practices are viewed as possible avenues for stopping germs from entering our bodies. This study will be important in expanding wellness and promoting benefits such as reduction in spread of infectious diseases leading to absenteeism from college; reduction in upper respiration illnesses; and reduction in diarrhea rate in educational institutions. In particular, it will be important to college students in promoting best handwashing practices with a view to protecting themselves, poor or rich, from droplets and airborne diseases such as measles, chickenpox, influenza, tuberculosis and diseases transmitted through fecal-oral roots.

METHODOLOGY

Data collection procedures

Data was collected using a semi structured questionnaire. The items in the questionnaire were developed in line with handwashing activities. Before administering the questionnaire, it was tested for validity and reliability to authenticate its usefulness in quality control. The questionnaire was tested in order to check its content, construct and face validity. Content validity was done to ensure it contains adequate domain of content it was supposed to represent. Face validity deals with formatting the instrument and includes aspects like clarity of printing, font size and type, adequacy of workspace, and

appropriateness of language among others. Construct validity determines the nature of psychological construct or characteristics measured by the instrument. Experts, and peers in research were engaged to ensure the instrument accurately measured the variables it was suppose to measure.

Data analysis

Data was entered in SPSS version 20.0 by properly trained staff with high level of accuracy and integrity in inputting data under the watch of the researcher. Double entry method was constituted to examine any discrepancy. Demographic data was analyzed by descriptive statistics. This was used to describe the variables in the sample. Data was then presented using frequency distribution tables and pie charts. Data on handwashing procedures was analyzed descriptively by crosstabs. The discrepancy between observed and expected frequencies was summarized in tabular form. This was done using the principle that the smaller the overall discrepancy between the observed and expected scores, the smaller was the value of chi-square; conversely, the larger the discrepancy between the observed and expected scores, the larger was the chi-square value.

RESULT

Table 1: Gender distribution of the students

Gender	Frequency	Percentage frequency
Female	122	63.2
Male	71	36.8
Total	193	100.0

Table 1 shows the response rate was 100% (193). Out of the 193 students, 63.2% (122) were females, while 36.8% (71) were males. The majority of the students were females.

Age distribution of the students

Varied responses from different age bracket were also expected to adequately explore behavior pattern from the entire students’

fraternity. The findings were shown in table 2.

Table 2: Ages of the respondents

Age brackets	Frequency	Percentage frequency
<20	5	2.6
20 - 29	150	77.7
30 - 39	31	16.1
>39	7	3.6
Total	193	100.0

Table 2 shows that of all students who took part in the study, 2.6% (5) were under 20 years; 77.7% (150) were aged between 20 and 29 inclusive; 16.1% (31) were aged between 30 and 39 inclusive; and 3.6% (7) were above 39 years of age. This shows that majority of the students were actually in youthful college going age and as search were in maturity stage where they could exercise hygiene on their own.

Highest educational level of the students

Table 3: Highest Educational Level of the Students

Highest education level	Frequency	Percentage frequency
secondary	12	6.2
tertiary	126	65.3
university	55	28.5
Total	193	100.0

Table 3 show that the response rate was 100% (193). Out of 193 students, 6.2% (12) had secondary education, 65.3% (126) had tertiary education, and 28.5% (55) had university education. From the data, majority of students 93.8% (181) had tertiary education and above. This meant that majority of the students had adequate knowledge and mental capability to respond to questions asked in the study.

Gender adherence to handwashing

Handwashing after visiting toilets

In this case, the null hypothesis was; “there is no difference in handwashing between male and female students.” Gender and handwashing after visiting toilets were the categorical variables each with two levels.

The results of the analyses are shown in table 4.

Table 4: Cross-tabulation on gender*handwashing after visiting toilet

Table 4a: Case Processing Summary						
	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Gender*handwashing after visiting toilet	193	100.0%	0	0.0%	193	100.0%

Table 4b: Gender*handwashing after visiting toilet cross-tabulation					
			handwashing after visiting toilet		Total
			yes	no	
Gender	Female	Count	121	1	122
		Expected Count	120.1	1.9	122.0
		% within Gender	99.2%	0.8%	100.0%
		% within handwashing after visiting toilet	63.7%	33.3%	63.2%
	Male	Count	69	2	71
		Expected Count	69.9	1.1	71.0
		% within Gender	97.2%	2.8%	100.0%
		% within handwashing after visiting toilet	36.3%	66.7%	36.8%
Total	Count	190	3	193	
	Expected Count	190.0	3.0	193.0	
	% within Gender	98.4%	1.6%	100.0%	
	% within handwashing after visiting toilet	100.0%	100.0%	100.0%	

Table 4c: Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.170 ^a	1	.279		
Continuity Correction ^b	.229	1	.632		
Likelihood Ratio	1.117	1	.291		
Fisher's Exact Test				.556	.305
Linear-by-Linear Association	1.164	1	.281		
N of Valid Cases	193				
a. 2 cells (50.0%) have expected count less than 5. The minimum expected count is 1.10.					
b. Computed only for a 2x2 table.					

Table 4 is divided into a, b and c. Table 4a is a case processing summary showing the response rate was 100% (193).

Table 4b shows that out of 193 students who participated in the exercise, 63.2% (122) were females while 36.8% (71) were males. The 122 females had 99.8% (121) washing hands. The other 0.8% (1) did not wash hands. The 71 males were distributed such that 97.2% (69) washed hands while 2.8% (2) did not. A total of 98.4% (190) students washed hands while 1.6% (3) did not. Out of those who washed hands, 63.7% (121) were females while 36.3% (69) were males. Out of those who did not wash hands, 33.3% (1) were females while 66.7% (2) were males.

The proportion of total students who washed hands was 98.4% (190). Out of this number, 62.7% (121) were females while 35.7% (69) were males. The proportion of total students who did not wash hands was 1.6% (3). Out of this number, 0.6% (1) was female while 1.0% (2) was male. Those who washed hands did so in order to: prevent bacterial infection; eliminate germs that one might have come into contact with while in toilet; remove dirt; remove bad smell from hands after using toilets; and adhere to standard health recommendations. Those who did not wash hands did not do so because of: not having time; not having any good reason for washing hands; and not used to washing

hands after visiting toilet. The results show that the proportion of female students washing hands was higher than that of males.

Table 4c is a chi square test table used to invalidate the results in table 4.4b. In table 4.4b, two of the four cells have their expected frequencies under the null hypothesis smaller than 5; Fisher's Exact test in table 4.4c was therefore used to test the hypothesis. The test show that *p value* of 0.556 was greater than 0.05. The null hypothesis was accepted at 5% significance level. There was no difference in handwashing after visiting the toilets

between male and female students. Any difference that was there could have been due to chance. Gender was not an important variable in determining handwashing among students.

Handwashing with soap and water

In this case, the null hypothesis of the study was, "there is no difference in handwashing with water and soap between male and female students." Gender and handwashing with soap and water were the categorical variables each with two levels. The results of the analyses are shown in table 5.

Table 5: Cross-tabulation on gender*handwashing with water and soap
Table 5a: Case processing summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Gender * Handwashing with water and soap	190	98.4%	3	1.6%	193	100.0%

Table 5b: Gender *Handwashing with water and soap cross-tabulation					
Gender	Female	Count	Handwashing with water and soap		Total
			yes	no	
		Expected Count	85.3	35.7	121.0
		% within Gender	64.5%	35.5%	100.0%
		% within handwashing with water and soap	58.2%	76.8%	63.7%
	Male	Count	56	13	69
		Expected Count	48.7	20.3	69.0
		% within Gender	81.2%	18.8%	100.0%
		% within handwashing with water and soap	41.8%	23.2%	36.3%
Total		Count	134	56	190
		Expected Count	134.0	56.0	190.0
		% within Gender	70.5%	29.5%	100.0%
		% within handwashing with water and soap	100.0%	100.0%	100.0%

Table 5c: Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig.(2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	5.893 ^a	1	.015		
Continuity Correction ^b	5.117	1	.024		
Likelihood Ratio	6.159	1	.013		
Fisher's Exact Test				.020	.011
Linear-by-Linear Association	5.862	1	.015		
N of Valid Cases	190				
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 20.34.					
b. Computed only for a 2x2 table.					

Table 5 is divided into a, b and c. Table 5a is a case processing summary showing that the

response rate for this particular hypothesis was 98.4% (190) students.

Table 5b shows that out of 190 students who responded to this hypothesis, 63.7% (121) were females while 36.3% (69) were males. Out of the 121 females 64.5% (78) washed hands with soap and water while 35.5% (43) did not. The 69 males were distributed such that 81.2% (56) used soap and water while 18.8% (13) did not. A total of 70.5% (134) students used soap and water while 29.5% (56) did not. Out of those who used soap and water, 58.2% (78) were females while 41.3% (56) were males. Those who did not use soap and water, 76.8% (43) were females while 23.2% (13) were males. The proportion of the total students who used soap and water was 70.5% (134). Out of this number, 29.5% (56) were males while 41.0% (78) were females. The proportion of the total students who did not use water and soap was 29.5% (56). Out of this number, 22.6% (43) were females while 6.9% (13) were males. Those who used water and soap did so because it: easily kills germs; contains detergents, which easily removes tough dirt; softens water making it easier to lather over hands; facilitates rubbing and friction that dislodge dirt; and leaves hand smelling pleasant. Those who did not use soap and water said that soaps were not available in the toilets all time; and where

there are soap dispensers, they are usually empty. The results show the proportion of female students using soap and water was higher than that of males.

Table 5c is a chi square test used to validate the results in 5b. It shows that $\chi^2_{computed} = 5.893$ and $\chi^2_{table\ value(0.05,1)} = 3.84$

. Chi square calculated is greater than the table value at 5% significance level. The null hypothesis was rejected. Moreover, $p = 0.015$ was less than 0.05. There was a difference in handwashing using soap and water between male and female students. Gender was an important variable in determining handwashing with water and soap among the students. The difference in proportion of male and female students washing hands with water and soap was not due to chance.

Duration of effective handrubbing

The null hypothesis was; “there is no difference in duration of effective handrubbing between male and female students.” Gender and duration of handrubbing were the categorical variables each with two levels. The results of the analyses are shown in table 6.

Table 6: Cross-tabulation on gender*duration of handrubbing

Table 6a: Case Processing Summary							
		Cases					
		Valid			Missing		Total
		N	Percent	N	Percent	N	Percent
Gender *duration of handrubbing		190	98.4%	3	1.6%	193	100.0%

Table 6b: Gender*duration of hand rubbing Cross-tabulation						
			Duration of handrubbing		Total	
			less than 20 seconds	more than 20 seconds		
Gender	Female	Count	59	62	121	
		Expected Count	52.9	68.1	121.0	
		% within Gender	48.8%	51.2%	100.0%	
		% within Duration of handrubbing	71.1%	57.9%	63.7%	
	Male	Count	24	45	69	
		Expected Count	30.1	38.9	69.0	
		% within Gender	34.8%	65.2%	100.0%	
		% within Duration of handrubbing	28.9%	42.1%	36.3%	
Total		Count	83	107	190	
		Expected Count	83.0	107.0	190.0	
		% within Gender	43.7%	56.3%	100.0%	
		% within Duration of handrubbing	100.0%	100.0%	100.0%	

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	3.490 ^a	1	.062		
Continuity Correction ^b	2.945	1	.086		
Likelihood Ratio	3.529	1	.060		
Fisher's Exact Test				.069	.043
Linear-by-Linear Association	3.471	1	.062		
N of Valid Cases	190				
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 30.14.					
b. Computed only for a 2x2 table					

Table 6 is divided into a, b and c. Table 6a is a case processing summary showing the response rate was 98.4% (190) students.

Table 6b shows that out of 190 students who responded to this particular hypothesis, 63.7% (121) were females while 36.3% (69) were males. Out of 121 females, 48.8% (59) practiced handrubbing for less than 20 seconds while 51.2% (62) practiced handrubbing for more than 20 seconds. The 69 males were distributed such that 34.8% (24) practiced handrubbing for less than 20 seconds while 65.2% (45) practiced handrubbing for more than 20 seconds. A total of 43.7% (83) students practiced handrubbing for less than 20 seconds while 56.3% (107) practiced it for more than 20 seconds. Out of the students who practiced handrubbing for less than 20 seconds, 71.1% (59) were females while 28.9% (24) were males. Those who practiced handrubbing for more than 20 seconds, 57.9% (62) were females while 42.1% (45) were males. The proportion of students who practiced handrubbing for more than 20 seconds was 56.3% (107). Out of this number, 23.7% (45) were males while 32.6% (62) were females. Those who practiced handrubbing for more than 20 seconds did so because proper hand cleaning: requires good time; ensures complete removal of germs that could hide in nails and between fingers; and

ensures that recommended cleanliness standards are met. Those who practiced handrubbing for less than 20 seconds did so: when in a hurry; as a habit; or as a feeling that more than 20 seconds is unnecessary. The results show that the proportion of female students who practice effective handrubbing was higher than that of males.

Table 6c was used to invalidate the results in 6b. It shows that $\chi^2_{computed} = 3.492$ and $\chi^2_{tablevalue(0.05,1)} = 3.84$.

Chi square computed is less than table value at 5% significance level. The null hypothesis was accepted. More so, $p = 0.062$ is greater than 0.05. There was no difference in practicing effective handrubbing between male and female students. Any difference that was there could have been due to chance. Gender was not an important variable in determining duration of handrubbing among students.

Rinsing hands

In this case, the null hypothesis was; "there is no difference in rinsing hands between male and female students." Gender and rinsing hands were the categorical variables each with two levels. The result is shown in table 7.

Table 7: Cross-tabulation on gender*rinsing hands

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Gender * Rinsing hands	190	98.4%	3	1.6%	193	100.0%

		Rinsing hands		Total	
		yes	no		
Gender	Female	Count	107	14	121
		Expected Count	107.6	13.4	121.0
		% within Gender	88.4%	11.6%	100.0%
		% within Rinsing hands	63.3%	66.7%	63.7%
	Male	Count	62	7	69
		Expected Count	61.4	7.6	69.0
		% within Gender	89.9%	10.1%	100.0%
		% within Rinsing hands	36.7%	33.3%	36.3%
Total		Count	169	21	190
		Expected Count	169.0	21.0	190.0
		% within Gender	88.9%	11.1%	100.0%
		% within Rinsing hands	100.0%	100.0%	100.0%

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.091 ^a	1	.763		
Continuity Correction ^b	.004	1	.952		
Likelihood Ratio	.092	1	.762		
Fisher's Exact Test				.815	.483
Linear-by-Linear Association	.090	1	.764		
N of Valid Cases	190				
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 7.63.					
b. Computed only for a 2x2 table					

Table 7 is divided into a, b and c. Table 7a is a case processing summary showing that the response rate was 98.4%, which accounted for 190 students.

Table 7b shows that of the 190 students that took part in the exercise, 63.7% (121) were females while 36.3% (69) were males. Out of 121 females, 88.4% (107) rinsed hands while 11.6% (14) did not. The 69 males were distributed such that 89.9% (62) rinsed hands while 10.1% (7) did not. A total of 88.9% (169) students rinsed hands while 11.1% (21) students did not. Out of the students who rinsed hands, 63.3% (107) were females while 36.7% (62) were males. Those who did not rinse hands were 66.7% (14) females against 33.3% (7) males. The proportion of the total number of students who rinsed hands was 88.9% (169). Out of this number, 32.6% (62) were males and 56.3% (107) were females. The proportion of total number of students who did not rinse hands was 11.1% (21). Out of this number,

7.4% (14) were females while 3.7% (7) were males. The students who rinsed hands did it because it completely washes off dirt that has been rubbed. They also felt that rinsing hands removes soap lather so that hands are left clean. Those who did not rinse hands felt that it was not necessary. The results show the proportion of female students who rinsed hands was higher than that of males. Table 7 is divided into three sections; that is, case processing summary, gender*rinsing hands cross-tabulation and chi square tests. Case processing summary shows the response rate was 190 students, which accounted for 98.4% of the sample size. The table on gender*rinsing hands shows that of the 190 students that took part in the exercise, 63.7% (121) were females while 36.3% (69) were males. Out of the 121 females, 88.4% (107) rinsed hands while 11.6% (14) did not. The 69 males were distributed such that 89.9% (62) rinsed hands while 10.1% (7) did not. A total of

88.9% (169) students rinsed hands while 11.1% (21) students did not. Out of the students who rinsed hands, 63.3% (107) were females while 36.7% (62) were males. Those who did not rinse hands had 66.7% (14) females against 33.3% (7) males. The proportion of total number of students who rinsed hands was 88.9% (169). Out of this number, 32.6% (62) were males and 56.3% (107) were females. The proportion of total number of students who did not rinse hands was 11.1% (21). Out of this number, 7.4% (14) were females while 3.7% (7) were males. The students who rinsed hands did it because it completely washes off dirt that has been rubbed. They also felt that rinsing hands removes soap lather so that hands are left clean. Those who did not rinse hands felt that it was not necessary. The results show the proportion of female students was higher than that of males. Chi square test was used to invalidate this claim.

Chi square tests show that $\chi^2_{computed} = 0.091$ and $\chi^2_{table\ value(0.05,1)} = 3.84$.

Chi square calculated was less than the table value at 5% significance level. The null hypothesis was accepted. Moreover, $p = 0.763$ was greater than 0.05. There was

no difference in rinsing hands between male and female students. Any difference that was there could have been due to chance. Gender was not an important variable in rinsing hands among students.

Table 7c is a chi square test used to invalidate the results in 7b. It shows that $\chi^2_{computed} = 0.091$ and $\chi^2_{table\ value(0.05,1)} = 3.84$.

Chi square calculated was less than the table value at 5% significance level. The null hypothesis was accepted. Moreover, $p = 0.763$ was greater than 0.05. There was no difference in rinsing hands between male and female students. Any difference that was there could have been due to chance. Gender was not an important variable in determining rinsing hands among students.

Drying hands with paper towel

In this case, the null hypothesis was; “there is no difference in drying hands with paper towel between male and female students.” Gender and drying hands with paper towel were the categorical variables each with two levels. The result was shown table 8.

Table 8: Cross-tabulation on gender*drying hands with paper towel

Table 8a: Case Processing Summary						
	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Gender * Drying hands with paper towel	190	98.4%	3	1.6%	193	100.0%

Table 8b: Gender * Drying hands with paper towel Cross-tabulation					
Gender	Female	Count	Drying hands with paper towel		Total
			yes	no	
		62	59		121
		Expected Count	66.2	54.8	121.0
		% within Gender	51.2%	48.8%	100.0%
		% within Drying hands with paper towel	59.6%	68.6%	63.7%
	Male	Count	42	27	69
		Expected Count	37.8	31.2	69.0
		% within Gender	60.9%	39.1%	100.0%
		% within Drying hands with paper towel	40.4%	31.4%	36.3%
Total		Count	104	86	190
		Expected Count	104.0	86.0	190.0

	% within Gender	54.7%	45.3%	100.0%
	% within Drying hands with paper towel	100.0%	100.0%	100.0%

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	1.645 ^a	1	.200		
Continuity Correction ^b	1.279	1	.258		
Likelihood Ratio	1.654	1	.198		
Fisher's Exact Test				.227	.129
Linear-by-Linear Association	1.636	1	.201		
N of Valid Cases	190				
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 31.23.					
b. Computed only for a 2x2 table					

Table 8 is divided into a, b and c. Table 8a is a case processing summary showing a response rate of 98.4% accounting for 190 students.

Table 8b shows that out of 190 students who took part in the exercise, 63.7% (121) were females while 36.3% (69) were males. Out of the 121 females, 51.2% (62) dried hands with paper towel while 48.8% (59) did not. The 69 males were distributed such that 60.9% (42) dried hands with paper towel while 39.1% (27) did not. A total of 54.7% (104) students dried hands with paper towel while 45.3% (86) students did not. Out of the number of students who dried hands with paper towel, 59.6% (62) were females while 40.4% (42) were males. Those who did not dry hands with paper towel had 68.6% (59) females and 31.4% (7) males. The proportion of total students who dried hands with paper towel was 54.7% (104). Out of this number, 32.6% (62) were females while 22.1% (42) were males. The proportion of total students who did not dry hands with paper towel was 45.3% (86). Out of this number, 31.1% (59) were females while 14.2% (27) were males. The students who used paper towel to dry hands felt that: wet surfaces act as breeding grounds for more bacteria; wet hands have water particles that could easily fall on food and contaminate it; wet hands cannot be used effectively on daily chores; and dry hands allow free circulation of air around the

fingers and that could cause comfort and relaxation. The students who did not dry hands with paper towel cited failure of college to provide paper towel in most toilets. Some of them did not understand the value of drying hands with paper towel. Some felt that paper towels leave particles on hand causing low trust thus resort to the use of automatic hand driers. Others felt that paper towels are put in areas of low safety standards and they may already contain bacteria. The results showed the proportion of female students who used paper towel to dry hand was higher than that of males.

Table 8c is a chi square test used to invalidate the results of table 8b. It shows that $\chi^2_{computed} = 1.645$ and $\chi^2_{table\ value(0.05,1)} = 3.84$. Chi square computed was less than the table value at 5% significance level. The null hypothesis was accepted. Moreover, $p = 0.200$ was greater than 0.05. There was no difference in using paper towel to dry hand between male and female students. Any difference that was there could have been due to chance. Gender was not an important variable in determining hand drying with paper towel among students.

Turning off tap with paper towel

The null hypothesis is; “there is no difference in turning off tap with paper towel between male and female students.” Gender and turning off tap with paper towel

were the categorical variables with two levels. The result was shown in table 9.

Table 9: Cross-tabulation on gender*turning off tap with paper towel

Table 9a: Case Processing Summary							
		Cases					
		Valid		Missing		Total	
		N	Percent	N	Percent	N	Percent
Gender * Using paper towel in turning of tap		190	98.4%	3	1.6%	193	100.0%

Table 9b: Gender*turning off tap with paper towel cross-tabulation						
			Turning off tap with paper towel		Total	
			yes	no		
Gender	Female	Count	41	80	121	
		Expected Count	40.8	80.2	121.0	
		% within Gender	33.9%	66.1%	100.0%	
		% within Turning off tap with paper towel	64.1%	63.5%	63.7%	
	Male	Count	23	46	69	
		Expected Count	23.2	45.8	69.0	
		% within Gender	33.3%	66.7%	100.0%	
		% within Turning off tap with paper towel	35.9%	36.5%	36.3%	
Total		Count	64	126	190	
		Expected Count	64.0	126.0	190.0	
		% within Gender	33.7%	66.3%	100.0%	
		% within Turning off tap with paper	100.0%	100.0%	100.0%	

Table 9c: Chi-Square Tests					
	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.006 ^a	1	.938		
Continuity Correction ^b	.000	1	1.000		
Likelihood Ratio	.006	1	.938		
Fisher's Exact Test				1.000	.535
Linear-by-Linear Association	.006	1	.939		
N of Valid Cases	190				
a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 23.24.					
b. Computed only for a 2x2 table					

Table 9 is divided into a, b and c. Table 9a is a case processing summary showing a response rate of 98.4% accounting for 190 students.

Table 9b shows that out of the 190 students that took part in the exercise, 63.7% (121) were females and 36.3% (69) were males. Out of the 121 females, 33.9% (41) turned off tap with paper towel while 66.1% (80) did not. The 69 males were distributed such that 33.3% (23) turned off tap with paper towel while 66.7% (46) did not. A total of 33.7% (64) students turned off tap with paper towel while 66.3% (126) students did not. Out of the students who turned off tap with paper towel, 64.1% (41) were females while 35.9% (23) were males. Those who

did not turn off tap with paper towel, 63.5% (80) were females while 36.5% (46) were males. The proportion of total students who turned off tap with paper towel was 33.7% (64). Out of this number, 21.6% (41) were females while 12.1% (23) were males. The proportion of the total students who did not turn off tap with paper towel was 66.3% (126). Out of this number, 42.1% (80) were females while 24.2% (46) were males. The students who used paper towel to turn off tap did so to avoid recontamination. Those who did not use paper towel to turn off tap reported that paper towels are not readily available in the toilets. Some argued that they clean the tap after use and view use of paper towel as unnecessary. Some of them

had never thought of turning off tap with paper towel and looked at it as less important. The results show the proportion of female students who turned off tap with paper towel was higher than that of males. A chi square test was therefore used to invalidate the results.

Table 9c is chi square test, which was used to invalidate results in 9b. It shows that

$$\chi^2_{computed} = 0.006 \text{ and } \chi^2_{tablevalue(0.05,1)} = 3.84 .$$

The chi square calculated is less than the table value at 5% significance level. The null hypothesis is accepted. Moreover, $p = 0.938$ was greater than 0.05. There was no difference in turning off tap with paper towel between male and female students. Any difference that was there could have been due to chance. Gender was not an important variable in determining turning off tap with paper towel among students

DISCUSSION

The first null hypothesis was, “there is no difference in handwashing between male and female students.” There was 100% response rate. Out of this, 63.2% (122) were females while 36.8% (71) were males. The 122 females had 99.8% (121) washing hands while 0.8% (1) did not. The 71 males were distributed such that 97.2% (69) washed hands while 2.8% (2) did not. A total of 98.4% (190) students washed hands while 1.6% (3) did not. Those who washed hands, 63.7% (121) were females while 36.3% (69) were males. Those who did not wash hands had 33.3% (1) females and 66.7% (2) males. The proportion of total students who washed hands was 98.4% (190). Out of this number, 62.7% (121) were females while 35.7% (69) were males. The proportion of total students who did not wash hands was 1.6% (3). Out of this number, 0.6% (1) was female while 1.0% (2) was male. Those who washed hands did so in order to: prevent bacterial

infection; eliminate germs that one might have contacted while in the toilet; remove dirt; remove bad smell from hands after using toilets; and adhere to World Health recommendations. Those who failed to wash hands: did not have time; did not have any good reason for handwashing; and were not used to handwashing after visiting toilets. The results showed the proportion of female students washing hands was higher than that of males. Using chi square, Fisher’s exact test was used to invalidate the claim. $p = 0.556$, was greater than 0.05. The null hypothesis was accepted at 5% significance level. There was no difference in handwashing after visiting toilets between male and female students. Any difference that was observed could have been due to chance. Gender was not an important variable in determining handwashing after visiting toilet.

The second null hypothesis was, “there is no difference in handwashing with water and soap between male and female students.” The response rate was 98.4% (190). Out of this number, 63.7% (121) were females while 36.3% (69) were males. The 121 females, 64.5% (78) washed their hands with soap and water while 35.5% (43) did not. The 69 males were distributed such that 81.2% (56) used soap and water while 18.8% (13) did not. A total of 70.5% (134) students used soap and water while 29.5% (56) did not. Those who used soap and water were 58.2% (78) females and 41.3% (56) males. Those who did not use soap and water were 76.8% (43) females and 23.2% (13) males. The proportion of total students who used soap and water was 70.5% (134). Out of this number, 29.5% (56) were males while 41.0% (78) were females. The proportion of total students who did not use water and soap was 29.5% (56). Out of this number, 22.6% (43) were females while 6.9% (13) were males. Those who used soap

and water did so because it: easily kills germs; removes dirt; contains detergents, which easily removes tough dirt; softens water making it easier to lather over hands; facilitates rubbing and friction that dislodge dirt; and leaves hand smelling pleasant. Those who did not use soap and water did not do so because it was not available in toilets at all time; and where there were soap dispensers, they were usually empty. The results showed the proportion of females using soap and water was higher than males. Chi square test was performed to validate the claim.

$$\chi^2_{computed} = 5.893 \text{ and } \chi^2_{table\ value(0.05,1)} = 3.84.$$

Chi square computed was greater than table value at 5% significance level. The null hypothesis was rejected. Moreover, $p = 0.015$ was less than 0.05. There was a difference in handwashing using soap and water between male and female students. Any similarity that was there could have been due to chance. Gender was an important variable in determining handwashing with water and soap among students.

The third null hypothesis was, “there is no difference in duration of effective handrubbing between male and female students.” The response rate was 98.4% (190). Out of this, 63.7% (121) were females while 36.3% (69) were males. The 121 females had 48.8% (59) practicing handrubbing for less than 20 seconds while 51.2% (62) practiced handrubbing for more than 20 seconds. The 69 males were distributed such that 34.8% (24) practiced handrubbing for less than 20 seconds while 65.2% (45) practiced handrubbing for more than 20 seconds. A total of 43.7% (83) students practiced handrubbing for less than 20 seconds while 56.3% (107) practiced it for more than 20 seconds. The students who practiced handrubbing for less than 20 seconds comprised 71.1% (59) females and

28.9% (24) males. Those who practiced handrubbing for more than 20 seconds comprised 57.9% (62) females and 42.1% (45) males. The proportion of students who practiced handrubbing for more than 20 seconds was 56.3% (107). Out of this number, 23.7% (45) were males while 32.6% (62) were females. The students who practiced handrubbing for more than 20 seconds did so because in their view, proper hand cleaning: requires good time; ensures complete removal of germs that could hide in nails and between fingers; and ensures that recommended hygienic standards are met. Those who practiced handrubbing for less than 20 seconds did so: when in a hurry; as a habit; or as a feeling that more than 20 seconds is unnecessary. The results showed that the proportion of female students practicing effective handrubbing was higher than that of males. Chi square test invalidated the claim.

$$\chi^2_{computed} = 3.492 \text{ and } \chi^2_{table\ value(0.05,1)} = 3.84.$$

Chi square computed was less than table value at 5% significance level. The null hypothesis was accepted. Moreover, $p = 0.062$ was greater than 0.05. There was no difference in effective handrubbing between male and female students. Any difference that was observed could have been due to chance. Gender was not an important variable in determining the duration of handrubbing among students.

The fourth null hypothesis was, “there is no difference in rinsing hands between male and female students.” The response rate was 98.4% (190). Out of this, 63.7% (121) were females while 36.3% (69) were males. The 121 females had 88.4% (107) rinsing hands while 11.6% (14) did not. The 69 males were distributed such that 89.9% (62) rinsed hands while 10.1% (7) did not. A total of 88.9% (169) students rinsed hands while 11.1% (21) students did

not. The students who rinsed hands had 63.3% (107) females against 36.7% (62) males. Those who did not rinse hands comprised of 66.7% (14) females and 33.3% (7) males. The proportion of total number of students who rinsed hands was 88.9% (169). Out of this number, 32.6% (62) were males and 56.3% (107) were females. The proportion of total number of students who did not rinse hands was 11.1% (21). Out of this number, 7.4% (14) were females while 3.7% (7) were males. The students who rinsed hands did it because it completely washes off dirt that could have been rubbed. They also felt rinsing hands removes soap lather so that hands are left clean. Those who did not rinse hands felt it was not necessary. The results showed the proportion of female students who rinsed hands was higher than males. Chi square test was used to invalidate the claim.

$$\chi^2_{computed} = 0.091 \text{ and } \chi^2_{table\ value(0.05,1)} = 3.84.$$

Chi square computed was less than table value at 5% significance level. The null hypothesis was therefore accepted. Moreover, $p = 0.763$ was greater than 0.05. There was no difference in rinsing hands between male and female students. Any difference that was observed could have been due to chance. Gender was not an important variable in determining hand rinsing among students.

The fifth null hypothesis was, “there is no difference in drying hands with paper towel between male and female students.” The response rate was 98.4% (190). Out of this number, 63.7% (121) were females while 36.3% (69) were males. Out of the 121 females, 51.2% (62) dried hands while 48.8% (59) did not. The 69 males were such that 60.9% (42) dried hands while 39.1% (27) did not. A total of 54.7% (104) students dried hands while 45.3% (86) students did not. The number of students who dried

hands was 59.6% (62) females and 40.4% (42) males. Those who did not dry hands comprised 68.6% (59) females and 31.4% (7) males. The proportion of total students who dried hands was 54.7% (104). Out of this number, 32.6% (62) were females while 22.1% (42) were males. The proportion of total students who did not dry hands was 45.3% (86). Out of this number, 31.1% (59) were females while 14.2% (27) were males. The students who used paper towel to dry hands had a view that: wet surfaces act as breeding grounds for more bacteria; wet hands have water particles that could easily fall on food and contaminate it; wet hands cannot be used effectively on daily chores; and wet hands does not allow free circulation of air around the fingers causing discomfort. The students who did not dry hands with paper towel cited failure of college to provide them in most toilets. Some of them did not understand the value of drying hands with paper towel. Some felt that paper towels leave particles on hand causing low trust. Paper towels are put in areas of poor safety standards and they may already contain bacteria. The results showed the proportion of female students who used paper towel to dry hand was higher than males. A chi square test was conducted to invalidate the claim.

$$\chi^2_{computed} = 1.645 \text{ and } \chi^2_{table\ value(0.05,1)} = 3.84.$$

Chi square computed was less than table value at 5% significance level. The null hypothesis was accepted. Moreover, $p = 0.200$ was greater than 0.05. There was no difference in using paper towel to dry hands between male and female students. Any difference that could have been observed was due to chance. Gender was not an important variable in determining hand drying with paper towel among students.

The sixth null hypothesis was, “there is no difference in turning off tap with paper

towel between male and female students.” The response rate was 98.4%, which accounted for 190 students. Out of this number, 63.7% (121) were females while 36.3% (69) were males. Out of 121 females, 33.9% (41) turned off tap with paper towel while 66.1% (80) did not. The 69 males were such that 33.3% (23) turned off tap with paper towel while 66.7% (46) did not. A total of 33.7% (64) students turned off tap with paper towel while 66.3% (126) students did not. The students who turned off tap with paper towel comprised 64.1% (41) females and 35.9% (23) males. Those who did not turn off tap with paper towel comprised 63.5% (80) females and 36.5% (46) males. The proportion of total students who turned off tap with paper towel was 33.7% (64). Out of this number, 21.6% (41) were females while 12.1% (23) were males. The proportion of total students who did not turn off tap with paper towel was 66.3% (126). Out of this number, 42.1% (80) were females while 24.2% (46) were males. The students who used paper towel to turn off tap did so to avoid recontamination of hands. Those who did not use paper towel to turn off tap said paper towels were not readily available in the toilets. Some argued that they clean tap after use and saw no use of paper towel in turning it off. Some of them had never thought of turning off tap with paper towel and viewed it as less important. The results showed the proportion of female students who turned off tap with paper towel was higher than that of males. A chi square test was used to invalidate this claim.

$$\chi^2_{\text{computed}} = 0.006 \text{ and } \chi^2_{\text{table value}(0.05,1)} = 3.84.$$

Chi square computed was less than table value at 5% significance level. The null hypothesis was accepted. Moreover, $p = 0.938$ was greater than 0.05. There was no difference in turning off tap with paper towel between male and female students.

Any difference that was observed could have been due to chance. Gender was not an important variable in determining turning off tap with paper towel among students.

CONCLUSIONS

Hands are washed after visiting the toilet to: prevent bacterial infection; eliminate germs that one might have come into contact with while in the toilet; remove dirt; remove bad smell from hands after using toilets; and adhere to recommended health requirements. Some students do not wash hands after visiting toilets because they do not have time; and have no good reason for doing so. Some do not wash hands after visiting toilets because they are not used to doing so. Though the proportion of female students who washed hands after visiting toilet was higher than males, chi square test showed there was no difference in handwashing after visiting toilets between male and female students. Any observed difference was due to chance. Gender was not an important variable in determining handwashing after visiting the toilet.

Hands are washed with soap and water to: kill germs; remove dirt; soften water making it easy to lather over hands; facilitate rubbing and friction that dislodge dirt; and leave hand smelling pleasantly. Hands are not washed with soap and water because soap is not always available in toilet; and soap dispensers, are sometimes empty. Descriptively, the proportion of female students using soap and water was higher than that of males. Chi square test confirmed there was a difference in handwashing using soap and water between male and female students. Any similarity that could be there was due to chance. Gender was an important variable in determining handwashing with water and soap.

Handrubbing for over 20 seconds is necessary because it ensures substantial

removal of germs that could hide in nails and between fingers and it meets recommended health standards set by health organizations. Practicing handrubbing for less than 20 seconds is usually seen when students are in a hurry or when such behavior is part of their habit. Females seem to have good handrubbing habit when data is descriptively analyzed but chi square test showed that there was no difference in effective handrubbing between male and female students. Any difference that was observed could have been due to chance. Gender was therefore not an important variable in determining duration of effective handrubbing among students.

Hand rinsing according to this study is necessary because it completely washes off dirt that has been rubbed. It is also felt that rinsing hands removes soap lather so that hands are left clean without soap particles. Those who do not rinse hands feel that it is not necessary. The proportion of female students rinsing hands was found to be higher than males. Chi square test showed that there was no difference in rinsing hands between male and female students. Gender was not an important variable in determining rinsing hands among students.

The reasons for drying hands with paper towel is because: wet surfaces act as breeding grounds for more bacteria; wet hands have water particles that could easily fall on food and contaminate it; wet hands cannot be used effectively on daily chores; and wet hands does not allow free circulation of air around fingers causing discomfort. The students who did not dry their hands with paper towel did not do so because of: failure by the college to provide paper towel in most toilets; students not understanding the value of drying hands with paper towel; paper towels leaving particles on hand causing low trust in their use; and paper towels being put in areas of

low safety standards and they may already contain bacteria. The proportion of female students who used paper towel to dry hands was higher than that of males. Chi square tests showed no difference in using paper towel to dry hands between male and female students. Gender was not an important variable in hand drying with paper towel among students.

Paper towel is used to turn off tap to avoid hand recontamination. It is not used to turn off tap because it is not readily available in toilets. Some students clean tap after use and view use of paper towel as unnecessary. Some of them has never thought of turning off tap with paper towel and view it as less important. The proportion of female students who turn off tap with paper towel was higher than that of males. Chi square test showed no difference in turning off tap with paper towel between male and female students. Gender was therefore not an important variable in turning off tap with paper towel among students.

Recommendations

Students should be trained on the values of giving handwashing time after visiting toilets. They should be trained that not washing hands after visiting toilets may cause very bad health consequences on the persons concerned. The question of not used to handwashing after visiting toilets should not be valued as a pertinent reason for prohibiting taking action. They should also be trained to know that handrubbing for over 20 seconds is the duration recommended by World Health Organization as it ensures substantial removal of germs that could hide in nails and between fingers. The benefits of hand rinsing like removal of soap lather so that hands are left clean without soap particles should also be emphasized in health training programs.

The college should be advised to consistently provide soap and paper towels for students in toilets so that they can optimally observe hygiene. If soap dispensers are used, then the college should make sure they always have soap in them. Paper towels should also be kept in hygienic places in order to avoid contamination before use.

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