Impacts of individual sanitation awareness on increasing the workability: a case of Varendra University Bangladesh.

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Abstract
This study has concentrated on sanitation awareness among the students of Varendra University Bangladesh and how they can protect themselves from various contagious diseases spread by bacteria, fungus, virus, dust, food elements, germs, etc., following a standard sanitation guideline. So, maintaining good sanitation helps of feeling better self-esteem. Conversely, it can make feel people less confident and unmotivated which impacts on workability. This study is based on primary data collected from students of nine academic departments with a self-administered questionnaire using a simple random sampling without a replacement method. IBM version 17 has used to code the data. Frequency distributions, cross tables, a multinomial logistic regression model, statistical charts and tests are also used to validate the assumptions. It has found that the majority of the respondents (86.6%) always follows washing hands before having food, 69.5% use soaps always to clean hands, 93.9% clean hands always after using a toilet, 85.3% take a bath daily, 76.1% wear clean clothes always, and 82.6% go to the washroom with footwear. 124 (32.6%) respondents have suffered from food poising, 104 (27.4%) from gastroenteritis, 80 (21.1%) from diarrhea, 16 (4.2%) from pneumonia, and 56 (14.7%) from skin infections. So, it is practically effective to nourish the habit of exercising proper health sanitation and this area can be a vast scope of the further study.
Keywords: - Sanitation; Infectious diseases; Awareness; Workability; Footwear.

I. Introduction

Good health requires proper functioning of all body organs, and it requires the efforts of taking good care of health which will make people free from diseases. Those who have good health are cheerful, free from stress, and enjoy life to the fullest. Thus, health and sanitation awareness tendency move people to people, community to community. It may also enable a student feeling well both in body and mind, to do well at the study, and so do in life. So, keeping a good standard of health sanitation helps people to prevent spreading out of infections, illnesses, and bad odors. A university is compared to knowledge generation unit which triggers to build a nation where faculties and students are part and parcel, come from different families with divergent socialization (Hasan, 2019). A person having good health, which mostly depends on being aware of sanitation, can perform every work with full enthusiasm. So, similarly, faculties and students can utilize their time on study if and only if good health accompanies with them (UK department of health, 2010). As a result, students will be able to show the best performance according to their ability. Even many of them achieve poor academic results due to improper diet, mental stress, lack of sanitation, unhealthy health conditions, etc. (Nandrup-Bus, 2009). Majority of the health problems affecting students can be avoided by being aware of cleanliness (Mohsen et al., 2014). Sanitation is the activities of cleaning the skin, hair, and nails in good condition (Allison et al., 2008). In private universities of Bangladesh, students have to complete their syllabus within the fixed four years. Despite extensive course load, they have to also participate in different extra activities. So, good health ensures continuous participation and attainment in the university. The consciousness of health cleanliness will make them feel more energetic to carry out both simple and exhausting tasks with more comfortably (Hossain, 2012). The hand-washing tendency is associated with the levels of education, gender, attitudes, and practices towards sanitation regarding food and environment (Allison et al., 2008 & Social Sciences Research Centre of the University of Hong Kong, 2006). So, this study focuses on the students' sanitation practices at Varendra University Bangladesh. According to the official web portal of Varendra University, "VU is the first private university established in 2012 at Rajshahi district in Bangladesh having approximately 5000 students currently in different disciplines including three faculties like Science & Engineering, Business and Law, and Humanities

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and Social Science. The mission of VU is to contribute a national development by producing innovative, skilled, and technologically trained human resource (2019). There are two types of sanitation: (a) individual and (b) environmental (Allison et al., 2008). However, the output of this study will be one of the best guidelines for the students of all over the world to increase awareness regarding their sanitation.

I.I Statement of Problem

Individual sanitation practices are often learned in the early years of one's life from the family and community followed after family members; friends, and other community members such as caretakers, teachers, and parents (Khanuja, 2018). Most of the germs and parasites get inside the body through our hands and mouth (Central Health Education Unit of Hong Kong, 2006). So, this study will suggest that students can easily prevent them from various hazardous diseases maintaining good sanitation which involves washing hands, brushing teeth, bathing, grooming, and doing laundry properly. Everybody avoids being with anyone who smells bad or does not clean his physic regularly; on the other hand, mandatory hand washing in elementary schools can significantly reduce the various infectious diseases (Nandrup & Bus, 2009). There are many diseases which can be caused by inadequate domestic or sanitation. Food poisoning, gastroenteritis, diarrhea, pneumonia, dental diseases and infections, trachoma, skin infections, etc. are the most common diseases which can keep away by taking care of individual health (Bland et al., 2012). In this study, the sanitation tendency is assessed by investigating a few questions those focus on increasing the students' intention towards making aware of cleanliness of different parts of the body which include the mouth, hands, and used clothes and these behaviors are correlated with the overall concept of sanitation. There are significant correlations between the improvement of hand cleanliness and reductions in a rate of infectious illnesses in the community which is effective against gastrointestinal and to a lesser extent in the respiratory infections (Khanuja, 2018). The author also suggested that the fingernails and toenails should keep clean, well rounded, and short; conversely, long nails may hurt one or others. Bathing is one of the best sanitation practices having benefits of reduction of various body secretions, microorganisms, debris and perspiration from the skin, improvement of joint mobility, feeling comfortable relaxation, beautification of skin status, and minimization of various physical problems or deterioration (Giulia et al., 2015). Germs are spread inside the house because of not having footwear and washing hands after using a toilet (Ministry of LGRDC Bangladesh, 2014). It also suggested that footwear acts as a comfy, protective agent against communicable foot diseases like athlete's foot and toenail fungus infections.

I.II Objectives of the Study

The study has undertaken to find out the status of sanitation among VU students and increasing awareness tendency towards various deadly disease profiles. It has also tried to investigate -----
   a) The present status of health sanitation among VU students.
   b) Find out the relationships between improper health sanitation status and various infectious diseases.
   c) Provide a standard guideline of dos and don'ts for improving sanitation and focusing on good sanitation practices.
   d) To increase students' awareness about the effects of poor sanitation and reduce the risk associated with poor sanitation practices.

II. Review of Literature

The elementary objective of this study is to review the present status of sanitation practice among the VU students and provide a standard guideline of increasing awareness among themselves. The proper awareness and practice of cleanliness of teeth such as flossing, brushing with fluoride toothpaste can prevent a lot of dental problems like cavities, sensitivity, bad smells, decaying of teeth, etc. (Bland et al., 2012). Clean clothes prevent various contagious diseases like Staphylococcus Aureus "Staph" caused by bacteria that leads one or more painful fever, herpes caused by virus which leads one or more painful blisters, and Tinea "Ringworm" caused by fungus that leads itchy, dry, red circular patches (Minnesota Department of Health Fact Sheet, n.d). Bathing, hand-washing, dressings, maintaining cleanliness inside and outside the house along with proper sanitation help in keeping the environment disease free (UK department of health, 2010). Knowledge, attitudes, food and environmental sanitation practices can prevent infectious diseases (Central Health Education Unit of Hong Kong, 2006).

II.I Individual Health Sanitation Research in Bangladesh:

Poor individual sanitation practices lead various infectious diseases like Staphylococcus (staph), Methicillin-Resistant Staphylococcus Aureus (MRSA), Acinetobacter, Fecal Coliforms, Suppressed Immune System, Re-infected of Foothold disease, Microbes of the Flu and Respiratory Virus, Tetro Agrees, etc. (Ministry of LGRDC Bangladesh, 2014). Urban households in Bangladesh were more likely to prone hand washing with soap than rural (Khanuja, 2018).

III. Conceptual Framework

III.I Evaluation of individual health sanitation

Good health provides a supportive environment, security, freedom of choice, social relationships, employment and income, access to educational resources, and cultural identity (WHO, 2006 & Millennium Assessment, 2005). One of the best effective ways to protect ourselves and others from illness is the awareness of sanitation. It means, be careful of cough or sneeze on others, cleaning things; otherwise we might be at risk of catching an infection. The USAID project report shows there is strong evidence between disease exposure and health sanitation factors (Shown in Figure 3.1) (USAID, 2015). Considering this disease pathway, the study was forwarded.
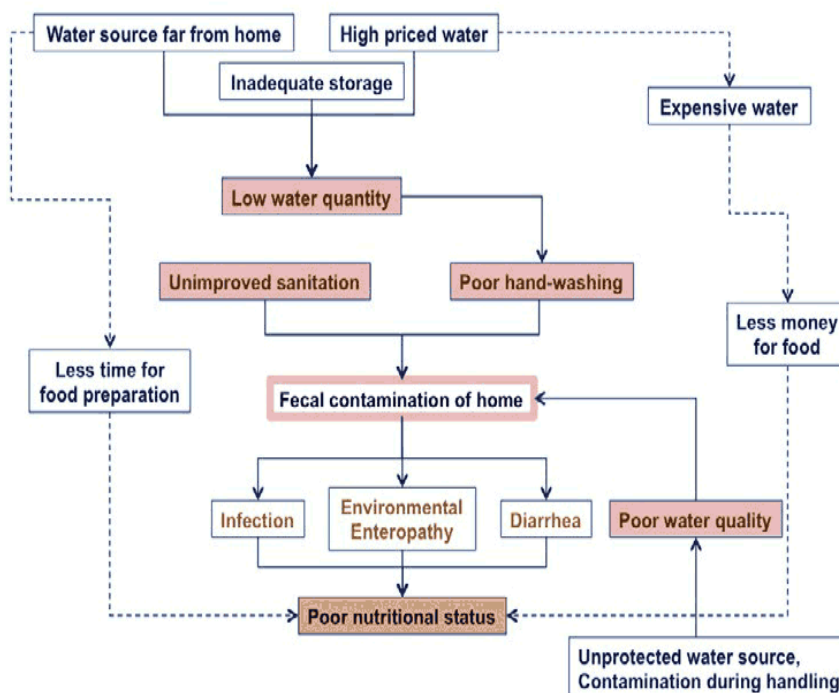

Figure 3.1: Flow chart of disease exposure (Diarrhea) on individual health sanitation status and sanitation factors.

IV. Research Methodology

IV.I Methods

This study was conducted among the students of VU in 2018. During this study, the total numbers of students were 5000 including nine academic departments under the three faculties like Science & Engineering, Business & Law, and Arts & Social Science (VU web portal, 2019). This study was based on primary data and the sample was collected from simple random sampling (SRS) without a replacement method of proportional allocation of size.

IV.II Determination of sample size

A cross-sectional survey was conducted among the students who were enrolled during the time of this study. The population size was 5000.

Table 4.1: Sample size determination

C	Z (5%)	P	Alpha	n	n*
0.05	1.96	0.5	0.05	384	354

Source: - Authors' field survey, 2018.

The sample size was calculated by the following formula

Sample size,

$$n = \frac{Z^2 \times P \times (1-P)}{C^2} \qquad (1)$$

Where:

Z = Z value (e.g. 1.96 for 95% confidence level),

p = percentage picking a choice, expressed as decimal (.5 used for sample size needed), and

c = confidence interval, expressed as decimal (e.g., .05 = ±5).

When, population size, N is known; new sample size, n* is calculated as-

New sample size, $n* = \frac{n}{1+\frac{n-1}{N}}$ (2)

Here, the population size, N=5000 which is known.

At a 5% level of significance, the proper sample size n* =354 (reported in table 4.1).

Table 4.2: The allocation of sample size according to the department

Department	Total students	Minimum required sample size	Collected sample size
CSE	841	70	85
EEE	348	29	30
BA	1123	94	97
Pharmacy	346	29	30
English	614	51	53
Sociology	314	27	28
LHR	411	35	36
Economics	151	13	14
JCMS	72	6	7
Total	5000	354	380

Source: - Authors' field survey, 2018.

The proper allocation of samples according to the size of the department based on a number of students is shown in table 4.2.

IV.III Survey questionnaires

A structured questionnaire survey was conducted for this study regarding washing hand before having food, using soap after using a toilet, taking a bath daily, wearing washed cloth, using a toilet with footwear, brushing teeth twice a day, changing toothbrush in time, cutting nail regularly, drinking protected water, hanging clothes in the sun after uses, covering mask at the time of sneezing, etc.

IV.IV Statistical analysis

Statistical Package for the Social Sciences (SPSS) IBM version 17 was used to code the survey questionnaires data. The intensity of diseases among the respondents was dependent upon health sanitation status, communal cleanliness, and associated factors. Frequency distributions, cross tables, statistical charts, and tests were conducted to evaluate the associations between disease exposure and individual health sanitation issues among VU respondents.

V. Results and Discussions

Table 5.1: Gender distribution among the respondents

Gender	Frequency	Percent
Male	223	58.7
Female	157	41.3
Total	380	100.0

Source: Authors' field survey, 2018.

This study comprises of 380 respondents whereas male was 223 (58.7%) and female were 157 (41.3%) (Reported in table 5.1).

Table 5.2: Individual health sanitation statuses among respondents

Washing hands before having food				Using soap to wash hands		
Particulars	**Frequency**	**Percent**		**Particulars**	**Frequency**	**Percent**
Always	329	86.6		Always	264	69.5
Frequently	23	6.1		Frequently	45	11.8
Sometimes	24	6.3		Sometimes	64	16.8
Never	4	1.1		Never	7	1.8
Total	380	100.0		Total	380	100.0
Washing hands after using the toilet				**Taking bath daily**		
Particulars	**Frequency**	**Percent**		**Particulars**	**Frequency**	**Percent**
Always	357	93.9		Always	324	85.3
Frequently	18	4.7		Frequently	41	10.8
Sometimes	4	1.1		Sometimes	14	3.7
Never	1	.3		Never	1	.3
Total	380	100.0		Total	380	100.0
Wearing washed clothes				**Going toilet with footwear**		
Particulars	**Frequency**	**Percent**		**Particular**	**Frequency**	**Percent**

Always	289	76.1		Always	314	82.6
Frequently	48	12.6		Frequently	24	6.3
Sometimes	39	10.3		Sometimes	23	6.1
Never	4	1.1		Never	19	5.0
Total	380	100.0		Total	380	100.0

Source: Authors' field survey, 2018.

Table 5.2 represents the individual health sanitation status among respondents. It was found that 86.6% of the respondents washed their hand always before having food, 69.5% used soap always to clean hand, 93.9% washed hand always after using the toilet, 85.3% took a bath daily, 76.1% put on clean clothes always, and 82.6% went the toilet with footwear.

Table 5.3: Frequency distribution of VU respondents faced the bacterial diseases during last one year

Particulars	Frequency	Percent
Food poisoning	124	32.6
Gastroenteritis	104	27.4
Diarrhoea	80	21.1
Pneumonia	16	4.2
Skin infections	56	14.7
Total	380	100.0

Source: Authors' field survey, 2018.

From table 5.3, we found that 124 (32.6%) respondents were suffering from food poising, 104 (27.4%) respondents were suffering from gastroenteritis, 80 (21.1%) respondents were suffering diarrhea, 16 (4.2%) respondents were suffering from pneumonia, and 56 (14.7%) respondents were suffering from skin infections during the year of 2018.

Table 5.4: Estimation results of multinomial logistic regression

Model	Model fitting information			
	Model fitting criteria	Likelihood ratio tests		
	-2 Log Likelihood	Chi-Square	df	Sig.
Intercept Only	404.390			
Final	360.168	44.222	24	.007

Source: Authors' field survey, 2018.

Multinomial logistic regression (MLR) model was used to detect the association of facing the bacterial diseases among VU respondents during 2018 with corresponding to ordinal covariates like washing hands before having food, using soap to wash hands, washing hands after using the toilet, taking bath daily, wearing washed clothes, and going toilet with footwear. Before running the MLR regression, obtaining a frequency of VU respondents faced bacterial diseases during 2018 was considered as the dependent variables. Since the majority of respondents were suffering from food poising in 2018. Hence, food poising was considered as the reference category.

Table 5.5: Estimation results of multinomial logistic regression.

Parameter Estimates

Facing the following bacterial diseases for last one year among respondents		B	Std. Error	Wald	df	Sig.	OR=Exp(B)	95% Confidence Interval for OR	
								Lower Bound	Upper Bound
Gastroenteritis	Intercept	0.271	0.541	0.252	1	0.616			
	Washing hands before having food	0.145	0.252	0.331	1	0.565	1.156	0.705	1.895
	Using soap to wash hands	0.304	0.184	2.716	1	0.099	1.355*	0.944	1.944
	Washing hands after using the toilet	-0.752	0.470	2.563	1	0.109	0.471	0.188	1.184
	Taking bath daily	0.683	0.303	5.067	1	0.024	1.979**	1.092	3.586
	Wearing washed clothes	-0.653	0.255	6.567	1	0.010	0.521**	0.316	0.858
	Going toilet with footwear	-0.182	0.192	0.900	1	0.343	0.834	0.573	1.214

Source: Authors' field survey, 2018.

Facing the bacterial diseases- gastroenteritis in 2018 among respondents had significant odds with corresponding to using soap to wash hands (OR=1.355, 95% CI= 0.944–1.944, P= 0.099<0.10), taking bath daily (OR= 1.979, 95% CI= 1.092–3.586, P= 0.024<0.05), and wearing washed clothes (OR= 0.521, 95% CI= 0.316–0.858, P= 0.010<0.05).

Table 5.6: Estimation results of multinomial logistic regression.

								95% Confidence Interval for OR	
Facing the following bacterial diseases for last one year among respondents		B	Std. Error	Wald	df	Sig.	OR=Exp(B)	Lower Bound	Upper Bound
	Intercept	0.436	0.689	0.401	1	0.527			
	Washing hands before having food	0.034	0.282	0.014	1	0.904	1.034	0.595	1.798
	Using soap to wash hands	0.168	0.202	0.691	1	0.406	1.182	0.796	1.756
Diarrhoea	Washing hands after using the toilet	-1.052	0.603	3.042	1	0.081	0.349*	0.107	1.139
	Taking bath daily	-0.236	0.376	0.395	1	0.530	0.790	0.378	1.649
	Wearing washed clothes	0.098	0.207	0.226	1	0.635	1.103	0.736	1.655
	Going toilet with footwear	0.079	0.175	0.203	1	0.652	1.082	0.767	1.526

Source: Authors' field survey, 2018.

Facing the bacterial diseases-diarrhea in 2018 among respondents had significant odds with corresponding to washing hands after using the toilet (OR=0.349, 95% CI= 0.107–1.139, P= 0.081<0.10).

Table 5.7: Estimation results of multinomial logistic regression

								95% Confidence Interval for OR	
Facing the following bacterial diseases for last one year among respondents		B	Std. Error	Wald	df	Sig.	OR=Exp(B)	Lower Bound	Upper Bound
	Intercept	14.217	0.949	224.501	1	0.000			
	Washing hands before having food	0.085	0.479	0.031	1	0.859	1.089	0.426	2.784
	Using soap to wash hands	0.780	0.296	6.930	1	0.008	2.181***	1.220	3.897
Pneumonia	Washing hands after using the toilet	-17.250	0.000	-	1	-	3.223E-8	3.223E-8	3.223E-8
	Taking bath daily	0.479	0.553	0.750	1	0.386	1.615	0.546	4.777
	Wearing washed clothes	-0.288	0.435	0.438	1	0.508	0.750	0.319	1.759
	Going toilet with footwear	-0.352	0.434	0.657	1	0.418	0.703	0.300	1.647

Source: Authors' field survey, 2018.

Facing the bacterial diseases- pneumonia in 2018 among respondents had significant odds with corresponding to using soap to wash hands (OR=2.181, 95% CI= 1.220–3.897, P= 0.008<0.01).

Table 5.8: Estimation results of multinomial logistic regression.

|								95% Confidence Interval for OR	
Facing the following bacterial diseases for last one year among respondents		B	Std. Error	Wald	df	Sig.	OR=Exp(B)	Lower Bound	Upper Bound
Skin infections	Intercept	0.387	0.844	0.211	1	0.646			
	Washing hands before having food	-0.211	0.354	0.356	1	0.551	0.810	0.404	1.621
	Using soap to wash hands	0.472	0.207	5.211	1	0.022	1.604**	1.069	2.405
	Washing hands after using the toilet	-0.817	0.709	1.327	1	0.249	0.442	0.110	1.774
	Taking bath daily	-0.721	0.532	1.832	1	0.176	0.486	0.171	1.381
	Wearing washed clothes	0.118	0.229	0.265	1	0.607	1.125	0.719	1.761
	Going toilet with footwear	-0.091	0.219	0.174	1	0.677	0.913	0.594	1.403

Source: Authors' field survey, 2018.

The reference category: Food poisoning.
- ❖ (***) marked represents the odds are significant at 1% level (P value<0.01),
- ❖ (**) marked represents the odds are significant at 5% level (P value<0.05) and
- ❖ (*) marked represents the odds are significant at 10% level (P value<0.10).

Facing the bacterial diseases- skin infections during last one year among respondents had significant odds with corresponding to using soap to wash hands (OR=1.604, 95% CI= 1.069–2.405, P= 0.022<0.05).
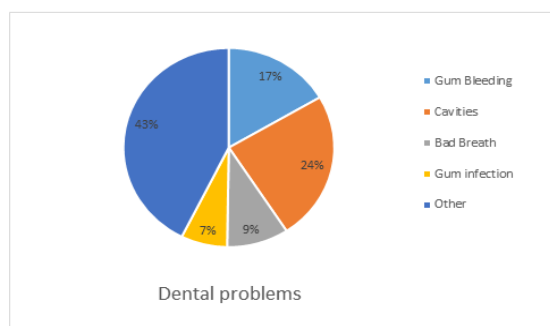
Figure 5.1: Oral health sanitation status
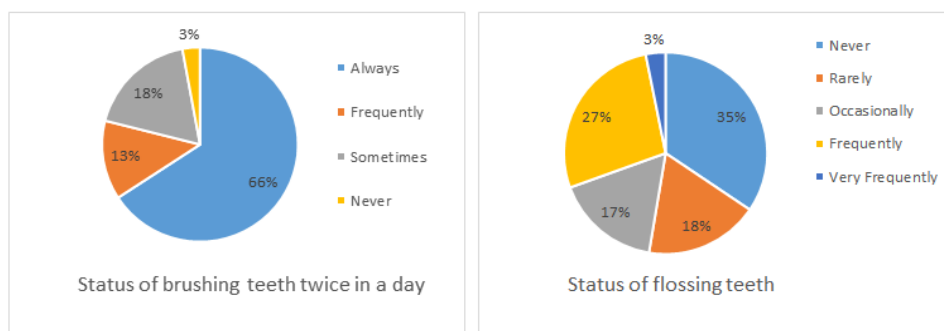
Source: Authors' field survey, 2018.

Figure 5.1 shows that 66% of respondents always brushed their teeth twice in a day whereas 35% of respondents never flossed their teeth.
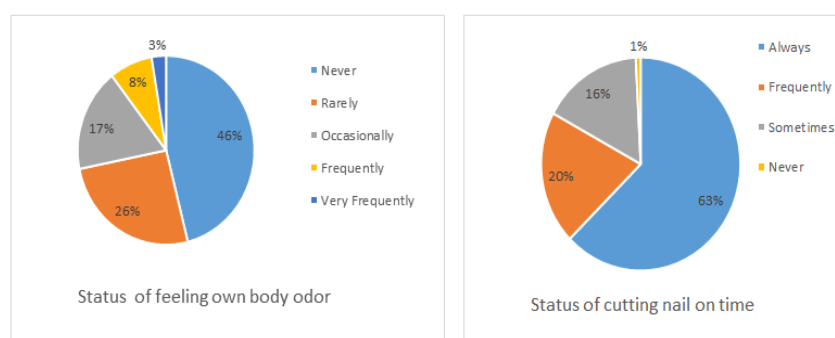
Figure 5.2: Faced dental problem during last year

Source: Authors' field survey, 2018.

Figure 5.2 shows that 17% of respondents suffered from gum bleeding, 24% from cavities, 43% from other dental problems.
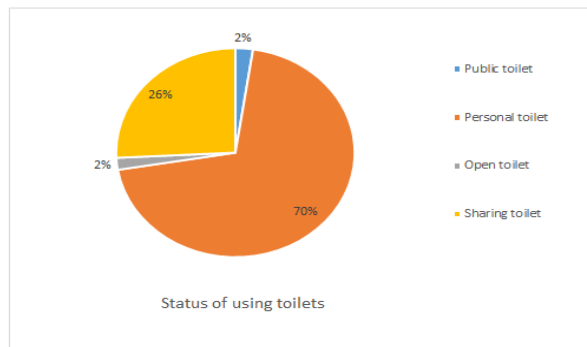
Figure 5.3: Status of feeling own body odor and cutting nail on time

Source: Authors' field survey, 2018.

Figure 5.3 shows that 46% of respondents never felt own body odor and 63% respondents always used to cut nail on time.
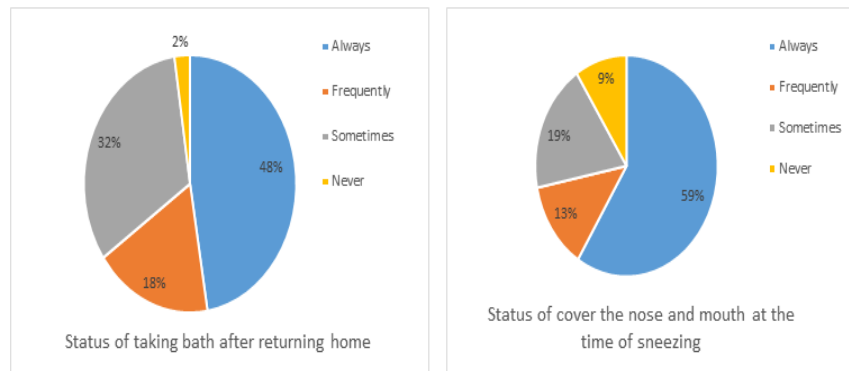
Figure 5.4: status of using toilet among respondents

Source: Authors' field survey, 2018.

Figure 5.4 shows that 70% of respondents used individual toilet whereas 26% used sharing a toilet.
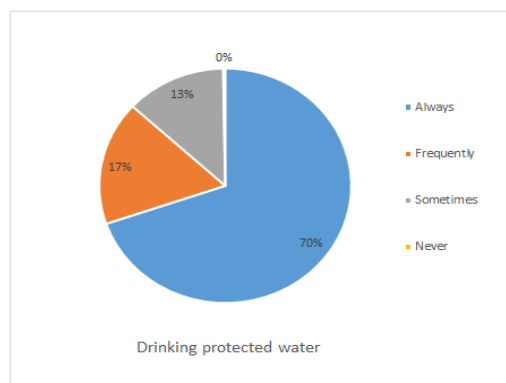
Figure 5.5: status of taking bath after returning home and covering nose and mouth at the time of sneezing

Source: Authors' field survey, 2018.

Figure 5.5 shows that 48% of respondents took bath always after returning home and 59% used to cover the nose and mouth at the time of sneezing.
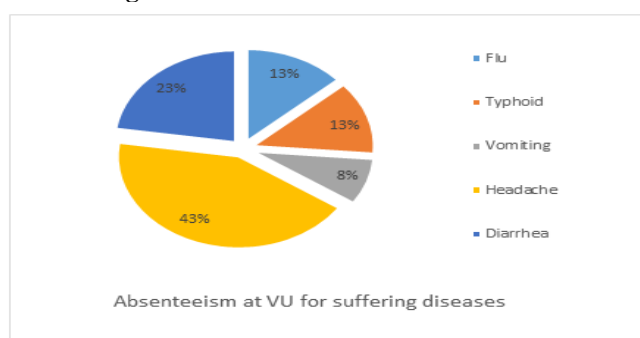
Figure 5.6: Status of drinking protected water

Source: Authors' field survey, 2018.

Figure 5.6 shows that 70% of respondents thought to drink protected water.

Figure 5.7: Status of absenteeism at VU

Source: Authors' field survey, 2018.
It is clear from Figure 5.7 that 43% respondents were absent at VU for suffering from headache.

Table 5.9: Cross table between brushing teeth twice in a day and facing dental problems

Brushing teeth twice in a day		Gum bleeding	cavities	Bad breath	Gum infection	others	total
				Facing dental problems			
Always	Count	40	60	24	16	110	250
	% of total	10.5%	15.8%	6.3%	4.2%	28.9%	65.8%
Frequently	Count	6	12	5	6	21	50
	% of total	1.6%	3.2%	1.3%	1.6%	5.5%	13.2%
Sometimes	Count	14	18	6	4	27	69
	% of total	3.7%	4.7%	1.6%	1.1%	7.1%	18.2%
Never	Count	3	2	1	1	4	11
	% of total	.8%	.5%	.3%	.3%	1.1%	2.9%
total	Count	63	92	36	27	162	380
	% of total	16.6%	24.2%	9.5%	7.1%	42.6%	100.0%

Test statistic	value	df	Statistical test Asymp.sig.(2-sided)	comment
Pearson Chi-Square	4.853	12	0.963	Insignificant (P>0.05). 8 cells (40.0%) have expected counts less than 5. The minimum expected count is 0.78.
Likelihood ration	4.503	12	0.973	Insignificant (P>0.05)
Contingency coefficient	0.112	12	0.963	Insignificant (P>0.05). Since the value of contingency coefficient is greater than zero; there is association between brushing teeth twice in a day and facing dental problems.

Source: Authors' field survey, 2018.

From Table 5.9 it can be concluded that since the value of the contingency coefficient is greater than zero. Therefore, there was an association between brushing teeth twice in a day and facing dental problems.

Table 5.10: Cross table between flossing teeth and facing dental problems

Flossing teeth		Gum bleeding	cavities	Bad breath	Gum infection	others	total
				Facing dental problems			
Never	Count	19	35	13	9	55	131
	% of total	5.0%	9.2%	3.4%	2.4%	14.5%	34.5%
Rarely	Count	18	17	9	4	21	69
	% of total	4.7%	4.5%	2.4%	1.1%	5.5%	18.2%
Occasionally	Count	11	13	9	6	25	64
	% of total	2.9%	3.4%	2.4%	1.6%	6.6%	16.8%
Frequently	Count	14	22	5	7	56	104
	% of total	3.7%	5.8%	1.3%	1.8%	14.7%	27.4%
Very frequently	Count	1	5	0	1	5	12
	% of total	0.3%	1.3%	0.0%	0.3%	1.3%	3.2%
Total	Count	63	92	36	27	162	380
	% of total	16.6%	24.2%	9.5%	7.1%	42.6%	100.0%

Test statistic	value	df	Statistical test Asymp.sig.(2-sided)	comment
Pearson Chi-Square	20.152	16	0.213	Insignificant at 21.2% level. 6 cells (24.0%) have expected counts less than 5. The minimum expected

				count is 0.85.
Likelihood ration	20.903	16	0.182	Significant at 18.2% level
Contingency coefficient	0.224	16	0.213	Significant at 21.2% level

Source: Authors' field survey, 2018.

Table 5.10 gives the outcomes that there was a strong association between flossing teeth and facing dental problems than brushing teeth twice in a day and facing dental problems.

Table 5.11: Cross table between drinking water sources and facing bacterial diseases

Drinking water sources		Food poisoning	Gastroenteritis	Diarrhoea	Pneumonia	Skin infections	total
			Facing dental problems				
Municipal tap	Count	41	35	36	1	16	129
	% of total	10.8%	9.2%	9.5%	0.3%	4.2%	33.9%
Bore well	Count	56	44	29	14	27	170
	% of total	14.7%	11.6%	7.6%	3.7%	7.1%	44.7%
Pond	Count	0	3	3	0	0	6
	% of total	0.0%	0.8%	0.8%	0.0%	0.0%	1.6%
Well	Count	27	22	12	1	13	75
	% of total	7.1%	5.8%	3.2%	0.3%	3.4%	19.7%
Total	Count	124	104	80	16	56	380
	% of total	32.6%	27.4%	21.1%	4.2%	14.7%	100.0%

Test statistic	value	df	Asymp.sig.(2-sided)	comment
			Statistical test	
Pearson Chi-Square	24.824	12	0.016	Insignificant at 5% level. 6 cells (30.0%) have expected counts less than 5. The minimum expected count is 0.25.
Likelihood ration	27.887	12	0.006	Significant at 1% level
Contingency coefficient	0.248	16	0.016	Significant at 5% level

Source: Authors' field survey, 2018.

Table 5.11 gives the outcomes that there was a significant association between dirking water sources and facing bacterial diseases.

Table 5.12: Cross table between status of using toilet and facing bacterial diseases

Status of using toilet		Food poisoning	Gastroenteritis	Diarrhoea	Pneumonia	Skin infections	total
			Facing bacteria diseases				
Public toilet	Count	2	1	4	1	1	9
	% of total	0.5%	0.3%	1.1%	0.3%	0.3%	2.4%
Personal toilet	Count	77	83	49	13	44	266
	% of total	20.3%	21.8%	12.9%	3.4%	11.6%	70.0%
Open toilet	Count	5	0	1	1	0	7
	% of total	1.3%	0.0%	0.3%	0.3%	0.0%	1.8%
Sharing toilet	Count	40	20	26	1	11	98
	% of total	10.5%	5.3%	6.8%	0.3%	2.9%	25.8%
Total	Count	124	104	80	16	56	380
	% of total	32.6%	27.4%	21.1%	4.2%	14.7%	100.0%

Test statistic	value	df	Asymp.sig.(2-sided)	comment
			Statistical test	
Pearson Chi-Square	25.242	12	0.014	Insignificant at 5% level. 11 cells (55.0%) have expected counts less than 5. The minimum expected count is 0.29.
Likelihood ration	27.155	12	0.007	Significant at 1% level
Contingency coefficient	0.250	12	0.014	Significant at 5% level

Source: Authors' field survey, 2018.

Table 5.12 gives the results that there was a significant association between the status of using a toilet and facing bacterial diseases.

Table 5.13: Obesity classification
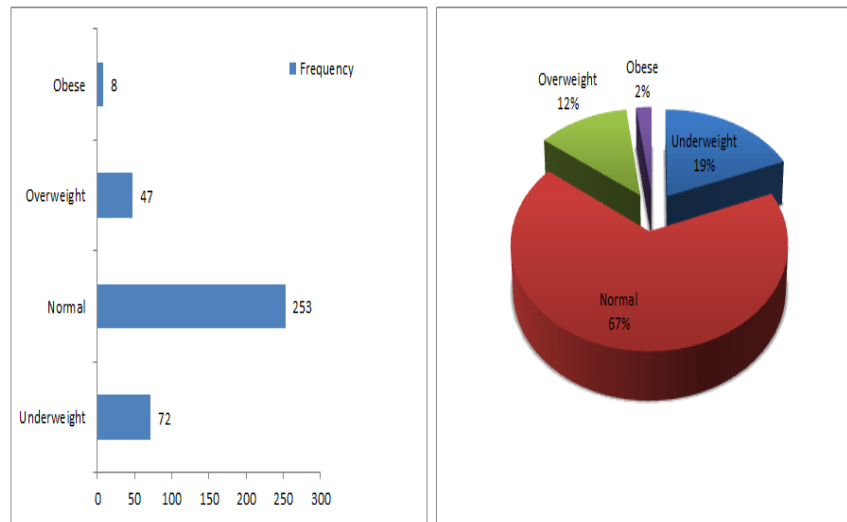
Source: Authors' field survey, 2018.

We know that BMI is a statistical measurement where BMI= $\dfrac{weight}{(Height)^2}$.

Table 5.13 shows that the majority of respondents' (67%) BMI was in a normal range.

Table 5.14: Descriptive statistics of BMI, age, and BP among respondents

Variables	Sample size statistic	Mean Statistic	Std.Error	Std, Deviation Statistic
BMI (Kg/m^2)	380	21.5967	0.179	3.489
Age (Years)	380	21.4053	0.099	1.941
Systolic BP (mm.Hg)	380	114.0974	0.587	11.444
Diastolic BP (mm.Hg)	380	76.6421	0.362	7.046

Source: Authors' field survey, 2018.

Table 5.14 shows that the mean BMI was in normal range according to WHO.

Table 5.15: Gender wise BMI classifications

Gender		Underweight	Normal	Overweight	Obese	total
Male	Count	25	159	35	4	223
	% of total	11.2%	71.3%	15.7%	1.8%	100.0%
Female	Count	47	92	12	4	157
	% of total	29.9%	59.9%	7.6%	2.5%	100.0%
Total	Count	72	153	47	8	380
	% of total	18.9%	66.6%	12.4%	2.1%	100.0%

Test statistic	value	df	Statistical test Asymp.sig.(2-sided)	comment
Pearson Chi-Square	23.936	3	0.000	Insignificant at 1% level. 2 cells (25.0%) have expected counts less than 5. The minimum expected count is 3.31.
Likelihood ration	23.952	3	0.000	Significant at 1% level
Contingency coefficient	0.243	3	0.000	Significant at 1% level

Source: Authors' field survey, 2018.

    Table 5.15 shows that there was a significant association between gender and BMI classifications. The female respondents were more under weight than male and the male respondents were more over weight than female.

VI. Conclusion and Recommendation

VI.I *Conclusins*

Majority of the respondents or 86.6% washed their hands always before having food, 69.5% used soap always to wash hand, 93.9% washed hand always after using the toilet, 85.3% took bath daily, 76.1% dressed washed clothes always, and 82.6% went toilet with footwear. 124 (32.6%) suffered from food poising, 104 (27.4%) from gastroenteritis, 80 (21.1%) from diarrhoea, 16 (4.2%) from pneumonia, and 56 (14.7%) from skin infections during 2018. MLR model shows a significant association of facing the bacterial diseases among VU respondents during 2018 with corresponding to ordinal covariates like washing hands before having food, using soap to wash hands, washing hands after using the toilet, taking bath daily, and wearing washed clothes. It was also significant at 1% level (P value < 0.01). 66% of respondents always brushed their teeth twice in a day, 35% never flossed their teeth, 17% suffered from gum bleeding, 24% from cavities, and 43% from other dental problems, 46% never felt own body odor, 63% always cut nail on time, 48% took bath always after returning home, 59% always covered the nose and mouth at the time of sneezing, 70% used individual toilet, 26% used sharing toilet, 70% thought that they drunk protected water, 43% were absent at VU for suffering from a headache. There was an association between brushing teeth twice in a day and facing dental problems. But, there was a strong involvement between flossing teeth and facing dental problems than brushing teeth twice in a day and facing dental problems according to the value of the contingency coefficient. There was a significant connection between dirking water sources and facing bacterial diseases as well as a significant relationship between the status of using a toilet and facing bacterial diseases. Majority of the respondents' (67%) BMI was in a normal range according to the standard of WHO. There was also a significant involvement between gender and BMI classifications. The female respondents were more underweight than male and the male respondents were more overweight than female.

VI.II **Recommendations**

Proper health sanitation should be exercised among VU students. It protects against the spread of diseases from external parasites. Regular washing and bathing should also be maintained. It protects the skin against rashes and infections. Oral hygiene should be followed to reduce dental problems. Suitable sanitation practice reduces the risk of malnutrition, swallowing difficulties, or infections caused by bacteria in the mouth getting into the bloodstream. Appropriate cleanliness should be maintained to shrink bacterial diseases. Keeping up proper hygiene lowers the risk of social embarrassment and eventual isolation from others. About emotional health, keeping oneself clean and neat improves morale and minimizes the risk of depression, anxiety, and stress.

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