

Environmental Sanitation Practices of the Occupants of Dormitories in Vigan City

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ABSTRACT

This study determined the level of environmental sanitation of selected dormitories in Vigan City based on the sanitation practices of the occupants and potability of water. It also looked into the level of sanitation practices along food preparation and cooking practices, garbage disposal, toilet sanitation and water sanitation. Drinking water samples were collected from four different dormitories for analysis. The data were gathered through a questionnaire-checklist supplemented by a personal interview. The statistical tools used were frequency count, percentage, mean and simple linear correlation analysis. Most of the respondents are 15 years old and first year college students. Some have suffered from diarrhea. The results of the physico-chemical analyses showed that the water samples exceeded the water quality standards prescribed by the Philippine National Standards for Drinking Water. There is an inverse significant relationship between the level of sanitation practices of the respondents and socio-demographic factors along year level and age but there is no significant relationship between the level of sanitation practices and socio-demographic factors along course, sex and diseases. On the other hand, an inverse significant correlation also existed between sanitation practices and coliforms and Escherichia coli. To prevent the spread of waterborne diseases, decontamination is highly recommended because of the presence of pathogenic microorganisms in the water.

Keywords: *Physico-chemical status; water quality standards; water borne diseases; decontamination*

INTRODUCTION

Environmental sanitation is the study of factors like water, air, soil, excreta, solid waste, pollution and housing present in man's physical environment which cause deleterious effect on his health, wellbeing, and survival. To protect man from these factors, and to promote a good and clean living environment, a proper environmental sanitation should be practised at all times. There are two dimensions of environmental sanitation, to wit: environmental factors and sanitation practices. Environmental factors include the disposal of human excreta, sewage, household waste and other wastes likely to contain infectious agents, water drainage, domestic water supply, and

housing (Prahlad, 2015). All of these have an impact on the individual's health and in the transmission of infectious agents and incidence of diseases.

On the other hand, sanitation practices refer to various hygiene practices of the communities, their basic knowledge, skills and human behavior. They are the social and cultural factors influencing health, lifestyle, and environmental awareness which include personal hygiene (washing and eating), household cleanliness (kitchen and bathroom cleanliness) and community hygiene (waste collections).

It is important that sanitation practices are properly observed for these result in numerous benefits that include lower health system costs and fewer days lost at school due to illness. A clean environment in dormitories, personal hygiene, and availability of adequate and safe drinking water determine the health of individuals.

As mentioned by Acharya (2015), water is one of the most important and most precious natural resources. It is essential in the life of all living organisms from the simplest plant and microorganisms to the most complex living system known as human body. Access to safe drinking water is key to sustainable development and is necessary in promoting food production, quality health and poverty reduction. Safe drinking water is essential to life and a satisfactory safe supply must be made available to consumers. Water is thus becoming a crucial factor for development and the quality of life in many countries. In individual arid areas, it has even become a survival factor.

Therefore, water intended for human consumption must not contain pathogen, germs or harmful chemicals because water contaminated with microorganisms is the cause of epidemics. The World Health Organization (WHO) revealed that seventy five percent of all diseases in developing countries arise from polluted drinking water.

Major public health problems like diarrhea, cholera, malaria and dengue, polio, amoebic dysentery and other diseases are caused by unsafe drinking water and poor sanitation. These diseases, in fact, kill more people every year than all forms of violence, including war. It is , therefore a crisis which people in the entire globe are facing right now.

In order to regulate and promote health, being of paramount importance, Presidential Decree No. 856 or the Code on Sanitation of the Philippines, provided for the Philippine National Standards for Drinking Water which establishes threshold limits for different impurities found in drinking water. These limits are intended to minimize risk and prevent deleterious health

repercussions that result from lifelong exposure to these impurities through consumption of water. In the Philippines, access to safe drinking water is not only essential for the promotion and protection of public health but is a basic human right. Provision of safe water supply prevents the transmission of waterborne pathogens and reduces the exposure of individuals to chemical and physical hazards that could be ingested through contaminated drinking water. Since water is a basic necessity, and an important resource for sustaining life, the decline in its quality endangers the health of humans.

In this respect, most students attribute their absences in class to diarrhea, Loose Bowel Movement (LBM), vomiting, headache, typhoid, malaria or dengue fever, all of which can be traced from a dirty environment which is a result of improper sanitation practices. Consequently, these students had poor academic performance resulting in low, if not failing, grades. Previous literature has shown considerable studies regarding the effects of lack of appropriate water facilities, and hygiene practices on child health outcomes. Joshi & Amadi (2013) mentioned that cognitive learning and learning performance are long-term outcomes of the negative effects of infections such as diarrhea and dehydrations which are largely attributed to poor water, sanitation, and hygiene conditions. "Attendance is a strong predictive factor of academic success for elementary school pupils". Based on the results of previous interventions, absenteeism due to illness has been shown to be reduced by the implementation of mandatory hand hygiene and sanitary procedures. The availability and utilization of alcohol-based sanitizers in schools have also been found to reduce absenteeism by about 20 to 50 percent.

It is precisely because of these diseases that a high standard of sanitation practices must be maintained in dormitories since these places are popular and provide affordable choice of housing for many people seeking for educational or employment opportunities. The standards provided for by law must strictly be complied with. In a communal living environment, any lapses in hygiene can easily result in rapid spread of infectious diseases. The landlords, as well as the boarders, are encouraged to clean, maintain and observe proper sanitation in and out of the dormitories. People who live or work in dormitories are at higher risk of acquiring communicable diseases. In line with this, the following are several existing problems that need a solution: unclean and inadequate water supply, unsanitary toilets, unclean kitchen, improper waste disposal, and other factors that, if left untreated, may cause threats to health. Specifically, the four selected dormitories are congested and have accommodated boarders beyond their capacity. Although they practice garbage disposal, the location of their comfort rooms is near the dining tables or near the source of drinking water. These factors may have caused contamination on the water such that the boarders were affected by waterborne diseases.

In view of the above problems, the researcher would like to determine the sanitation practices of the respondents in selected dormitories in Vigan City. This study explored the situation of the respondents' environment and analyzed the efforts of the boarders and the landlords in promoting a sanitary environment and in preventing the spread of diseases.

This study aimed to determine the extent of environmental sanitation practices of the respondents in terms of food sanitation, ecological sanitation and water sanitation and the potability of water or physico-chemical status in selected dormitories in Vigan City; the relationship between sanitation practices and socio-demographic profile of the respondents and the significant relationship between sanitation practices and water analysis, and physico-chemical status of water.

Specifically, it sought to look into the socio-demographic profile of the respondents in terms of course, year level, age, sex, and diseases, the physico-chemical status of water in selected dormitories in Vigan City, the environmental sanitation practices of the respondents in terms of food sanitation, ecological sanitation, and water sanitation, and the significant relationship between sanitation practice and water analysis, and the physico-chemical status of water.

This study aimed to contribute to the body of knowledge regarding environmental sanitation and to the development of more in-depth researches on environmental sanitation practices in the future.

Environmental Sanitation Theory

On Food Preparation and Cooking Practices

Food is any substance, usually composed primarily of carbohydrates, fats, water and/or proteins that can be eaten or drunk for nutrition or pleasure (Octaviano & Balita, 2008). Items considered food may be sourced from plants, animals, or other categories such as fungus or fermented products like alcohol.

Most traditions have recognizable cuisine, specific sets of cooking traditions, preferences, and practices, the study of which is known as gastronomy. Many cultures have their food by means of preparation, cooking methods and manufacturing. This also includes a complex food trade which helps cultures to economically survive by way of food, not just by consumption.

The term "cooking" encompasses a vast range of methods, tools and combinations of ingredients to improve the flavor digestibility of food. Cooking technique, known as culinary art, generally requires the selection, measurement and

combination of ingredients in an ordered procedure in an effort to achieve the desired result. Constraints on success include the variability of ingredients, ambient conditions, tools, and skills of the individual (Joshi & Amadi, 2013). The diversity of cooking worldwide is a reflection of the myriad nutritional, aesthetic, agricultural, economic, cultural and religious considerations that impact upon it.

According to the theory of Octaviano and Balita (2008), which states that for the environment to be healthy and conducive for health, it has to fulfill five essential components namely: pure air, pure water, efficient drainage, cleanliness and light. Although this theory is widely used in the field of nursing, it can also be applied in this study since the scope of this research focuses on the environmental factors and effects of these factors on health.

The theory further states that sanitation is the means by which manipulation of the environment could be done in order to prevent a dirty environment as well as the occurrence of infection and diseases. Specific sanitary practices are also utilized to ensure a clean environment. Some of these practices include proper disposal of sewage, clean clothing, and hand washing. Even up to this present date, this environmental theory of Nightingale still holds true and is still used as a guide in preventing the occurrence of diseases, especially communicable diseases.

On Garbage Disposal

Open dumps/ garbages are poor methods of waste disposal because they cause environmental problems like the occurrence and spread of illnesses. They create a place for rodents and pests to thrive and to spread diseases. Most dumps allow some burning or incineration, causing smoke that contributes to air pollution and thinning of the ozone layers.

Incineration produces waste products. It may release gases and solid particles that may harm human health and damage properties and the environment. There are other ways to help reduce the amount of solid wastes like composting and recycling. In composting, garbage is exposed to controlled amounts of heat, oxygen, and moisture, which make it decay faster. The resulting decayed material called compost is used as fertilizer. In recycling, items such as metal, cans, and newspapers are processed so that the materials they are made of can be revised to serve other purposes.

On Water Sanitation

For a large percentage of the world's population, drinking water supplies sanitation. Sources are neither safe nor adequate. According to Joshi

and Amadi (2013), over a billion people do not have access to adequate supply of water for household in municipal areas.

Hazardous wastes, solid, liquid or gas wastes can cause death, illness, or injury to people, and destruction to the environment when improperly treated, stored, transported, or discarded. Reda (2015) states that substances are considered hazardous wastes if they are ignitable (capable of burning), corrosive (able to corrode steel) reactive (able to explode), or toxic (containing poisonous substances). Many dangerous substances can be used only with special precautions that decrease the risks. When discarded, these substances are no longer under the direct control of the users thus they pose special hazards to people or other organisms that come in contact with them.

On Toilet Sanitation

Sanitation standard is intended to ensure that boarding house owners provide their boarders with sanitary and available toilet facilities to prevent adverse health effects. Individuals vary significantly in the frequency in which they need to urinate and defecate, like in the cases of pregnant women, women with stress incontinence, and men with prostatic hypertrophy who need to urinate more frequently. Increased frequency of voiding may also be caused by various medications, by environmental factors such as colds, and by high fluid intake, which may be necessary for individuals working in a hot environment. Diet, medication use, and medical condition are among the factors that can affect the frequency of defecation.

Food and Water Borne Diseases

Ortiz-Correa (2015) mentioned that food processing and distribution of foods and beverages can be easily contaminated by bacteria, viruses, worms and other organisms. Sewage is water containing waste matter produced by people. It contains about 1% solid waste. Water pollutants result from many human activities. Pollutants from industrial sources may pour from the outfall of pipes of factories or may leak from pipelines and underground storage tanks. Cities and other residential communities contribute mostly sewage, with traces of household chemicals mixed in. Sometimes industries discharge pollutants into city sewers, thus increasing the variety of pollutants.

Environmental Sanitation Theory by Florence Nightingale

Prahlad (2015) coined the term “Sociology of Sanitation”. He stated that sociology of sanitation is a scientific study to solve the problems of society in relation to sanitation, social deprivation, water, public health, hygiene, ecology, environment, poverty, gender equality, welfare of children and empowering people for sustainable development and attainment of philosophical and

spiritual knowledge to lead a happy life and to make a difference in the lives of others.

Hygiene and sanitation interventions have had considerable impact on reducing diarrhea and absenteeism rates in school-age children. In a study conducted in Denmark, two schools comprising 652 students were randomized into an intervention and a control group. The students at the intervention school were required to wash their hands before the first lesson, before lunch, and before going home while those at the control school continued their usual hand washing practices. The rates of absenteeism for the students in the intervention school were significantly reduced compared with those in the control school. The effects of reduced absenteeism were more prominent on female students compared to their male counterparts (Wasike, 2010).

Moreover, in a study conducted in North Texas, installing liquid soap in dispensers in student restrooms followed by sustained instruction in hand washing and monitoring of hygiene practices among students was performed (Wasike, 2010). The results showed that appropriate soap supplies and repeated instruction in hand washing and its monitoring were needed to control the Shigella outbreak. Again, a study conducted in Chicago assessed the role of hand hygiene instruction in decreasing illness-related absenteeism in two public elementary schools during the peak flu season. Classrooms were systematically assigned to an intervention or control group by grade level. Hand hygiene facilities were made available to all students. Students in the intervention group also received short repetitive instruction in hand hygiene every two months. The results of the study showed higher rates of attendance among students that received hand hygiene instruction during the flu season.

A key factor which determined the child's access to safe water sources and improved sanitation and hygiene infrastructure was socio-economic status. Individuals with higher socio-economic index especially in the middle 40% generally reflected the positive outcomes of the health interventions compared to those with a lower index. The incidence of respiratory infections was also significantly associated with independent variables including child's age, gender, and family wealth (Ortiz, 2015).

In line with food preparation and cooking practices, according to Acharya, K. (2015), the absolute safety of a food or an ingredient can never be guaranteed. Similarly, this theory is applicable in dormitories especially where no appropriate precautions are taken during purchasing of raw materials, development through manufacturer into products, processing, and final preparation and distribution. This argument indicates that, the risks from any food can be kept to an absolute minimum i.e. any level of contamination from

the source of raw materials used in the preparation of food items in the dormitories can be prevented to avoid diseases.

METHODOLOGY

The study employed the descriptive correlational methods of research. The descriptive method was used to determine the socio-demographic profile and sanitation practices of the respondents. A survey questionnaire adopted from Balauro et al. (2002) was used in gathering data regarding the socio-demographic profile and environmental sanitation practices of the respondents in dormitories in Vigan City. The experimental method of research was used to measure the potability of drinking water in terms of pathogenic bacteria present in water samples. The researcher formulated the questionnaire on the occurrence of food and waterborne disease and it was content validated by a pool of experts

The respondents of the study are the 176 students living in the four selected Dormitories of Vigan City namely: Dormitory A, Dormitory B, Dormitory C and Dormitory D.

The survey questionnaire consists of two parts. Part I consists of items regarding the socio-demographic profile of the respondents and Part II elicited information on the sanitation practices of the respondents.

In conducting the study, the researcher secured permission from the owners of the four selected dormitories to administer the questionnaire to the boarders whose consent to answer the said questionnaire was sought.

The following statistical tools were used to treat and interpret the data collected: Frequency count and Percentages, Mean, and Simple Linear Correlation analysis.

RESULTS AND DISCUSSION

Socio-demographic profile of the respondents

After a thorough analysis and interpretation of the data gathered, the results showed that a great number of the respondents are enrolled in the College of Criminology, a marked percentage are first year, and 15 years old. Majority of the respondents belong to the male group and a great percentage suffered from diarrhea.

On the results of the microbiological analysis of the water samples

Shown in Table 1 are results of the microbiological analysis of the water samples obtained from the four dormitories which shows the presence of coliform and *E. coli*. Dormitory A has the highest coliform and *Escherichia coli* (8MPN/100 ml) while the lowest are dormitories C and D (1.1MPN/100 ml). The coliform and *E. coli* of the four dormitories exceeded the normal range (lesser < than 1.1 MPN/100 ml) based on the Philippine National Standards for Drinking Water. This implies that the drinking water from the four different dormitories is not potable.

Table 1
Results of the Water Analysis (DOST)

Dormitory	Bacteria/Microbes (MPN/100ml)	Interpretation
Coliform		
Dormitory A	8	Above normal
Dormitory B	6.3	Above normal
Dormitory C	1.1	Above Normal
Dormitory D	1.1	Above Normal
Escherichia coli		
Dormitory A	8	Above normal
Dormitory B	6.3	Above normal
Dormitory C	1.1	Above Normal
Dormitory D	1.1	Above Normal

Legend: lesser than (<1.1) MPN/100ml (normal range)

This could be due to the presence of compost pits in the backyard which are not 30 meters away from the source of potable water and that garbage is dumped less than 30 meters away from the dormitories. It may also be due to the garbage cans which are not covered that attract flies, insects and rodents as mentioned by some of the respondents.

The American Water Work Association reported that the use of chemical disinfectants in water treatment or construction materials used in water supply system usually results in the formation of the chemical by-products, some of which are potentially hazardous. This makes drinking water as a vehicle in the transmission of diseases (Joshi & Amadi, 2013).

On the Incidence of Food and Water-borne Diseases

Table 2 shows the Incidence of Food and Water-borne Diseases among the borders in the four dormitories. The results show that Dormitory C has the highest incidence rate of food and water borne diseases as reflected by the incidence of 42.55 and 42.50 respectively. This means that the boarders in Dormitories C and A, have higher risk of acquiring food and waterborne diseases. (Based on the interview of the researcher to the dormitorians.) This

could be attributed to instances like; cooks are allowed to prepare food despite being sick which can cause the possible transmission of diseases, failure or lack of interest of the cooks to read informational materials on proper selection, handling and preparation of food, not allowing the dishes and silverwares to drain and dry completely before use and failure to boil drinking water coming from NAWASA for 15 to 30 minutes.

Table 2

Incidence of Food and Water Borne Diseases in Selected Dormitories in Tamag, Vigan City

Dormitories	Population	No. of Residents who got sick	Incidence
Dormitory A	40	17	42.50
Dormitory B	52	10	19.23
Dormitory C	47	20	42.55
Dormitory D	50	18	36.00
Overall	189	65	34.39

On Summary of the level of Sanitation Practices of the Respondents

The summary of the level of sanitation practices of the respondents is reflected on Table 3. The overall results show that sanitation is highly practiced. The boarders observed a very good level of sanitation practices, thus the occurrence and transmission of communicable diseases have been minimized, if not totally prevented.

Table 3

Summary of the Level of Sanitation Practices of the Respondents

PRACTICES	Mean	DR
Food Preparation and Cooking Practices	3.94	High
Garbage Disposal	3.64	High
Water Sanitation	3.86	High
Toilet Sanitation	3.91	High
Overall	3.84	High

Relationship between the level of Sanitation Practices of the Respondents and Their Socio-Demographic Profile

Shown in Table 4 is the relationship between the level of sanitation practices of the respondents and their socio-demographic profiles. As a whole, there is an inverse significant relationship between the level of sanitation practices among year level ($r = -0.1665$) and age ($r = -0.1624$). This could mean that the lower the year level and age of the respondents the higher is their level of sanitation practices. It was found out that there is no significant relationship between the level of sanitation practices of the respondents and their course, sex and diseases which means that the course they are enrolled in, sex and the diseases they experienced do not influence their sanitation practices. On the

other hand, there is an inverse significant relationship between the level of sanitation practices of the respondents along garbage disposal($r=-0.2008$), toilet sanitation ($r=-0.1623$) and year level. There is also an inverse significant relationship between the level of sanitation practices of the respondents along food preparation and cooking practices ($r=0.1880$) age, garbage disposal and sex. The results imply that at the younger and lower year level the student respondents are, the higher is their level of sanitation practices. The younger males are more interested in food preparation, cooking and garbage disposal. This result may be attributed to the fact that students in higher year levels do not have ample time to do the sanitation practices because they have more assignments to finish and have more difficult subjects to study than the younger ones .

Table 4
Correlation Coefficients Showing the Relationship between the Level of Sanitation Practices of the Respondents and their Socio-Demographic Profile

Socio-Demographic Factors	Food Preparation & Cooking Practices	Garbage Disposal	Water Sanitation	Toilet Sanitation	As a Whole
Course	0.0194	0.0252	-0.0384	-0.0315	-0.0090
Year Level	-0.1499	-0.2008*	-0.0427	-0.1623*	-0.1665*
Age	-0.1880*	-0.1069	-0.1230	-0.1508	-0.1624*
Sex	0.0495	-0.1859*	-0.0446	0.0471	-0.0524
Disease	-0.1023	-0.0469	-0.0294	-0.1339	-0.0887

- significant at .05 level of probability

Relationship between the extent of sanitation practices of the respondents and water analysis and the incidence of food and waterborne diseases

The relationship between the extent of sanitation practices of the respondents and water analysis and incidence of food and waterborne diseases is reflected in Table 5.

Table 5
Correlation Coefficients Showing the Relationship between the level of Sanitation Practices of the Respondents and Water Analysis and Incidence of Food and Water Borne Disease

Water analysis and Incidence of Food and Water Borne Diseases	Food Preparation & Cooking Practices	Garbage Disposal	Water Sanitation	Toilet Sanitation	As a whole
Coliforms	-0.0330	0.2694*	0.2610*	0.0350	0.1757*
Escherichia coli	-0.0330	0.2694*	0.2610*	0.0350	0.1757*
Incidence	-0.0849	0.0812	-0.2380*	-0.0814	-0.0872

•- significant at .05 level of probability

As a whole, there is a significant relationship between level of sanitation practices and bacterial count (coliforms & Escherichia coli) $r=0.1757$. The table above shows that there is a significant relationship between the level of sanitation practices of the respondents along garbage disposal ($r=0.2694$), water sanitation ($r=0.2610$) and coliform. A significant relationship also existed between the level of sanitation practices of the respondents along garbage disposal ($r=0.2694$), water sanitation ($r=0.2610$) and Escherichia coli count. Moreover, there is a significant relationship between the level of water sanitation practices of the respondents and incidence of food and water borne diseases. Among the four levels of sanitation practices, only water sanitation ($r=-0.2380$) shows an inverse significant relationship with incidence. All these results could only mean that water has been contaminated due to lapses committed in the disposal of garbage, thereby causing the non-potability of water in the area where the dormitories are located. In this respect, Ortiz-Correa (2015) found that inequality in access to clean water and sanitation may translate into inequalities in health and education. Lack of nontoxic water and sewerage system, household members, children in particular, can be more susceptible to contamination of water-related and water-transmitted diseases that could cause them from absenteeism resulting to low academic performance. Academic performance in school can be influenced by the presence of clean water and good sanitation services in two different ways. First, water-related diseases are transmitted through five main routes: waterborne diseases, water-washed diseases, water-based diseases, water-related and vector-borne diseases, and water-dispersed infections. Second, studies have found that dehydration may harm cognitive discrimination and short-term memory. As a result, lack of potable water weakens children's academic performance by reducing their cognitive capacity.

CONCLUSION

Based on the results of the study, it can be inferred that a great percentage of the respondents are enrolled in the College of Criminology, 15 years old and first year college students and majority of them are males. Also, a marked percentage of the respondents suffered from diarrhea despite the observance of a high level of sanitation practices. It was also found out that there is an inverse significant relationship between the level of sanitation practices of the respondents and socio-demographic factors along year level and age but there is no significant relationship between the level of sanitation practices and socio-demographic factors along course, sex, and diseases.

On the other hand, there is a significant relationship between the level of sanitation practices of the respondents and water analysis and water borne diseases.

RECOMMENDATION

The owners and caretakers should conduct periodic meeting concerning desirable sanitation practices with the boarders inside and outside the UNP campus to maintain, if not to improve, the present level of sanitation. Results of the research must be disseminated to the boarders especially to the dormitory owners, barangay officials of Tamag, Vigan City and Office of the City Mayor for immediate action and proper management, particularly of water sources. The City of Vigan, through its legislative body should enact and implement a policy/ordinance which requires a sanitary inspector or engineer to conduct surprise visits or inspections in the dormitories to check compliance with existing laws and assess the potability of water. Some necessary actions, such as giving warning for the first visit or a penalty of fine and/or suspension of business permit to operate, must be imposed if existing laws are not complied with and if water is found to exceed the normal range of potability. In this sense, the respondents' safety will be assured in terms of the potability of drinking water in their respective dormitories. The drinking water from different sources must undergo decontamination processes such as boiling, chlorinating and distilling processes to help prevent the spread of waterborne diseases. A follow-up study should be conducted to validate the result of this study and serve as a baseline data for further planning and improvement of the environmental sanitation of the selected dormitories of Vigan City. In conducting a similar research, future researchers should consider other variables not covered by this study, with a bigger sample size and with more measures of evaluation to analyze the contents of water supply and possible sources of causative factors for the occurrence of water related diseases.

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