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KNOWLEDGE AND ATTITUDES OF STUDENTS IN CENTRIA UNIVERSITY OF APPLIED SCIENCES TOWARDS EFFECTIVE HAND HYGIENE: Reduction and Prevention of Infection in the University Campus.

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ABSTRACT

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Name of thesis KNOWLEDGE AND ATTITUDE OF STUDENTS IN THE CENTRIA UNIVERSITY OF APPLIED SCIENCES TOWARDS EFFECTIVE HAND HYGIENE: Reduction and prevention of infection in the university campus.		
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The purpose of the thesis was to study the possible problems with proper hand hygiene in reducing and preventing the spread of infections in Centria University of Applied Sciences. The goal was to know how well the knowledge of hand hygiene is known to the students and their attitudes towards maintaining good hand hygiene and to find possible ways for better adherence. The quantitative research method was used. Questionnaire was divided in 3 sections and sent to students through the webropol online survey tool. Results from the findings indicated that majority of the students maintained good hygiene prior and after eating. The students also maintain good hand hygiene after using the restroom.

The results revealed that although majority of the students wash hands during these cases most of them do not fully know or understand the right procedures and techniques of proper and effective hand hygiene and the right use of alcohol hand rub in the prevention of illness. In the conclusion it came to attention that there is the need for further education for the students on the various procedures of proper hand and personal hygiene to effectively prevent the spread of infection. It was recommended to hold hand hygiene educational events interesting enough to attract students from all the various fields of study to participate.

Key words
Hand hygiene, alcohol hand rubs, knowledge, and hand-wash

LIST OF ABBREVIATIONS

CDC – Center for Disease, Control and Prevention

DHS – Department of Health Service (Wisconsin)

FIU – Florida International University

PHMCDG – Public Health Medicine Communicable Disease Group

SAH – South Australian Health

WHO – World Health Organization

UAS – University of Applied Sciences

ABSTRACT
LIST OF ABBREVIATIONS

CONTENTS

1 INTRODUCTION

Infection control is stated to be the laid down policies, methods and formalities reputable for the investigation, prevention, and regulation of infection (FIU 2007). One of the basic and most effective ways of preventing the spread of infection is by proper hand hygiene which involves an active process of practically performing hand washing, antiseptic hand-wash, and alcohol-based hand rub (CDC 2002). There are various ways infection is spread and considering the active population of students in a given unit the spread of infection is higher if preventive measures are not enforced. Hence students need to be encouraged and re-educated about the importance to maintain a high hand hygiene status so as to prevent any spread of infection and thereby not being a mode of spread in the university. Infection prevention and proper hand hygiene should be stressed upon so as to prevent universities being a point of outbreak and spread of infection in outbreak cases. (CDC 2002.)

The aggravations of asthma are periodic with higher risk in students taking incidence immediately after returning from the summer holidays to school. There are various surveys suggesting that this periodic uplift of the aggravations related to asthma is basically related to viral respiratory tract infections. (Gerald et al 2011). A lot of these agents that bring about the infection get transferred by hands. This occurs mostly in situations where hands are not being kept clean at most times and cases where an infected or contagious person being a carrier of the infection does not maintain good hand hygiene. Most certainly he or she touches inanimate objects due to the school environment setting and makes these objects modes of contact for the spread of the carried infection. Surfaces that are possible risks of being mode of contact in the spread of infection in the university may include walls, floors, tables, chairs, and doorknobs. (CDC 2011.) According to WHO, in reducing these risks related to the spread of such infections, the use of proper hand hygiene is very vital (WHO 2012).

The purpose of the thesis is to study the possible problems with proper hand hygiene in reducing and preventing the spread of infections amongst students in the University of Applied sciences. The goal is to find out how well the knowledge of hand hygiene is made known to the students in Centria University of Applied Sciences and their attitudes towards maintaining good hand hygiene and to find possible ways the students can adhere to it better. The author was interested in this topic because of personal experience with contact to nosocomial infection. Although having knowledge on hand hygiene individuals still find themselves in such positions where they act as carriers in infecting others or themselves due to having contact with various bacteria daily. Individuals do see the need to wash their

hands on a regular basis but sometimes unable to comply to this due to certain reasons such as sore hands after constant washing and drying or excessive work load. (Akyol 2007.)

2 THEORITICAL FRAMEWORK

Hygiene refers to the instances and established ways of conduct which aids to uphold and preserve health and further prevent the spread of diseases (WHO 2017). Hand hygiene is the active process of practically performing hand washing, antiseptic hand-wash, and alcohol-based hand rub. It is also described to be the efficient yet short rubbing of all surfaces of the hands with lathered soap which is then followed with rinsing and cleansing under flowing streaming water. (CDC 2009). Hand washing complies of manually getting rid of visible short term contaminants from hands by using soap and water (SAH 2015). Antiseptic hand wash involves performing hand washing with any detergents which has an antiseptic content. Alcohol based hand rub is basically using any mixture with alcohol in rubbing the whole hands surface area. (WHO 2009.)

Hand washing may seem to be an easy task but certain measures are essential to follow in order to decrease the amount of microbes on hands in preventing infection. The steps necessary to be followed include first taking away any rings or bracelets from the wrist or fingers and wet the hands water. Then soap is added and all folds and surfaces of the hands including the back of the hand and nails must be lathered and cleaned with the soap for not less than 15 seconds. The hands are then rinsed under flowing water in a rubbing movement. Once all visible foam or slippery soapy feeling on the hands is off, dry hands gently to prevent breaking the skin with paper towel or any clean towel. The tap is then turned off using the paper towel to prevent recontamination of the fingers after wash. In cases where public restrooms are used the paper towel can be used to open the door on your way out after washing hands. (Health Canada 2009).

There are situations and moments in which hand hygiene must be maintained at all cost. These moments are situations where there is an instinctual or real danger of transferring microbes from one point of contact to the other by aid of the hands. Having contact with contaminants from infected environment is one of the reasons an individual needs to clean the hands by proper hand washing and using alcohol hand rub to prevent carrying harmful pathogens from the hands to other surfaces and objects in the university environment (WHO 2006). Another instance is when there is contact with body fluids such as urine or blood. Hands then must be washed clean and disinfected to prevent spreading any microbes and this is to protect the individual and the school environment from contamination. (WHO 2006). On a regular day, certain activities require an individual to perform hand hygiene. These activities include changing a baby or elderly diapers, using the toilet, before and after handling food, after

sneezing, coughing or blowing nose, after taking care of someone who is ill, after throwing garbage away, and after smoking. (SAH 2012).

Hand washing with soap and water is always preferably more efficient in removing and reducing the amount of microbes on the hands. It is more effective to perform both hand hygiene and use antiseptic alcohol base hand rubs. The use of alcohol hand sanitizers is mostly implemented when there is no soap and water. There are other instances that hinder the individual's ability to perform hand washing with soap and water. The use of alcohol hand based disinfectants containing 60% alcohol is used in such cases. (CDC 2016).

Infections or bacteria that cause illness could be spread through several means and ways. There are 5 common ways in which bacteria that causes infection can be spread. Infections can be spread through intestinal action or through faeces. This is common in cases such as a student having diarrhea or Hepatitis A. The second most common is by the respiratory tract. This is usually accompanied with lungs, nose, eyes, and mouth secretion most commonly in disease cases such as common cold or influenza. The third common way is through direct or indirect contact. In direct contact infection occurs where there is skin contact with infected body fluids, or through sexual contact. This is most common in instances where the infected individual is suffering from bacterial skin infections like scabies, or impetigo. Indirect contact involves the contracting of infection by means of coming in contact which inanimate objects infected with the bacteria. These inanimate objects may include pencils, handkerchiefs, cutleries, door knobs, tables, chairs and other surfaces that have been contaminated by infections such as the influenza virus and the common cold. The forth way of being infected is by coming in contact with contaminated blood with illness such as HIV AIDS, Hepatitis B, and Hepatitis C. The fifth is by eating or swallowing contaminated food or water in cases of food poisoning. (PHMCDG 2014).

Instances and certain situations also tend to be barriers and or levers to the maintaining or performance of proper and effective hand hygiene. These barriers or levers include environmental factors, social/cultural factors, knowledge or skills of students, aftermath consequences, student's study profession, individual motivation towards hand hygiene, student's attitude, and memory lapses. These levers or barriers also have an effect on respiratory hygiene in situations where students are ill with a cough or flu. The fundamentals of respiratory hygiene comprise protecting or covering ones mouth or nose by the use of a tissue paper or handkerchief when coughing or sneezing. Also the bending of the elbow into a crook could be improvised to hold back respiratory droplets from contaminating surrounding surfaces. (DHS 2016).

Furthermore, tissue papers used in holding respiratory droplets or secretions must be discarded into any close by waste bin immediately after use. It is important to also maintain hand hygiene by washing hands with non-antimicrobial soap and water, using alcohol hand rub, or performing an antiseptic hand wash as soon as hands come in contact with items or surfaces contaminated with respiratory droplets or secretions. Surfaces visible with respiratory secretions should be cleaned with tissue. Alcohol based disinfectants should then be used in cleaning the surfaces after they have been wiped with the tissue. (DHS 2016).

3 PREVIOUS STUDIES

Related to the study articles, chosen keywords include hand hygiene, alcohol hand rubs, knowledge, and hand-wash. The main data bases used include Elsevier: Science direct, Pubmed, Ovid, Sage, EBSCO and CINAHL. These articles were taken with relevance to the study topic.

Storr and Clayton-Kent (2004) carried out a study on hand hygiene. The main aim of this article was to deliver unto the reader an evaluated result of the way hand hygiene practice can be boosted to get most individuals to comply. The article goes to elaborate on the reasons related to the low level of adherence to hand hygiene policies. The author recommended systematic approaches in aiding individuals adjust to occasional performance of hand hygiene in order to prevent spread of infections. The article explained certain barriers that hinder effective hand hygiene. These include;

> *Skin problems caused by hand hygiene products, insufficient education; Lack of access to facilities to clean the hands. Individual attitudes, beliefs and behavior do not support hand hygiene. Lack of role models in the working environment, Lack of management or organizational support, Workload and activity levels do not support hand hygiene. (Storr & Clayton-Kent 2004.)*

A survey by Barrett and Randle (2007) about "Hand hygiene practices: nursing students' perceptions". The aims focused on the perceptual knowledge student nurses had towards hand hygiene practices in a clinical environment. The objective of the study was to find out the things that affected the perceptions of these students and other individual's adherence to hand hygiene. A qualitative interpretive design method was used and 10 students took part in the study. Results of the study revealed that the perception of the student of things which hindered the compliance to hand hygiene were less time, being too busy, clinical procedures, skin condition, lack of knowledge, and glove use. The authors went on to state that the perception most of the students had were seeing the other health care workers as an influence in compliance to hand hygiene because of the idea of "fitting-in" with the health workers in the clinical area. It should not be underestimated how influential other health care workers are as role models. (Barrett & Randle 2007.)

An article by Taylor et al. (2010) was about Hand hygiene knowledge of college students. The purpose of the study was to observe and estimate the behaviors of students related to their hygiene conducts in the fields of their study courses, gender, and understanding towards hygiene. A number of 100 students

were experimented on at random in 10 different restrooms in the university to ascertain if these students in reality wash their hands. The study was split into 3 examinational categories to acquire the required feedback. These included a platform where the students would be observed, made questions in the form of a quiz to determine the knowledge field of the students about hand hygiene and how pathogens are spread, and an investigation of personal illness rates. The results of the study proposed that amongst the number of student that went into the various restrooms females had the tendency to wash their hands more often as compared to males. Also, it was noticed that students in the science majoring fields had a higher probability in washing their hands than non-science majors. Further findings went on to show that students who rarely washed their hands after using the rest room reported sick more often as compared to those who were regular in washing their hands each time they visited the restroom. (Taylor et al 2010.)

In addition, there was a study on the proper hand washing practices among elementary school students in Selat Nasik-district Indonesia by Setyautami et al. 2011. The purpose of this article was to explain a representational illustrative study on the practice of hand washing, the frequency of proper hand washing, and other aspects connected within 6^{th} grade students in an elementary school in the Selat district of Indonesia. According to the study there was a dispensation of questionnaires to 274 students in 7 different schools that were picked at random by 5 villagers in accordance to the size ratio. The study noted that 9 groupings related to hand washing surfaced which connected students washing hands with the use of soap and water in connection with 2 significant incidents. These incidents included moments before the students had to eat and moments after using the restroom. Findings of the study indicated that only a percentage of 40.5 of the respondents performed proper hand washing. It was observed that the obtainability or accessibility of clean water and soap being available at hand washing posts were viewed to be substantial predictors of washing hands properly in occasions when adapted with other influences. The results of the study showed that there was a very low occurrence of proper hand washing amongst the elementary students and hence there is a need of more effective hand washing promotions in schools and the need of better services to boost the prevalence on the right way of washing hands among the students. (Setyautami et al 2011.)

A survey on the inspections of hand washing supplies and hand sanitizer in public schools by Ramos et al. 2010 was undertaken for a similar cause. This study was performed to identify and measure the frequency at which hand washing materials such as soap, paper towels, and hand sanitizers were being supplied in the public schools. A setting of 10 school districts which were grounds for 93 schools was taken as participants for the inspections undertaken by the school nurse. According to the survey, in

November 2008, 90 schools submitted their results of the inspection performed and this made up 97% of returned feedback from all 10 school districts. Information gathered from the total 697 bathrooms showed that 88.8% of them had soap and 91.7% had paper towels and hand dryers for getting hands dry after hand washing is performed. Feedback received on hand sanitizer in bathrooms was 1.2% and 15.25 in school cafeterias. No observations were made in terms of male or female bathrooms neither were they distinguished within primary or secondary schools concerning the supply of soap, paper towels or hand dryers. It was concluded that alcohol-based hand sanitizers in the school bathrooms were accounted for infrequently. Whereas hand sanitizer in a regulated location such as school cafeterias were not often accounted for and hence needs to be promoted. (Ramos et al 2010.)

In another survey undertaken by Asiedu et al. 2011, elaborated on the topic hand washing practices among school children in Ghana. The goal of this study was to find solution to the increase rate of the spread of diarrheal diseases and other communicable diseases. In order to achieve their goal there was a need to understand the knowledge and practices among the target group and this was to aid them prepare behavioral solutions. A sum total of 295 school going children were indiscriminately and casually chosen to partake in the study. The results explained that majority of the students did not exercise proper hand washing using soap as a result of unobtainability and no possible access to hand washing supplies such as soap, towel and a clean running source of water. Nevertheless, most (90.2%) of the students who visited the restroom washed hands with soap and water. 63% ($p=0.02$) gathered from the private schools were identified to have a less probable chance to wash hands after using the restroom, 51% ($p=0.03$) less probable to wash hands before eating and 77% ($p < 0.001$) less probable to wash hands after eating in comparison to the public school students. (Asiedu et al 2011.)

Le Thi Thanh and Luu Ngoc Hoat, 2013, on the topic Handwashing Among School Children in an Ethnically Diverse Population in Northern Rural Vietnam, had the aim of their study on describing hand washing behavior and compliance to hand washing with soap in Vietnam. A number of 319 school children were chosen from the 1st, 4th, and the 7th grades of the chosen school. Amongst the 319 chosen school children that got interviewed, it was summed that 66% of the students performed handwashing with the use of soap. It was identified in the result that 10% of the students that were interviewed executed the process of hand washing satisfactoryily. It was also indicated in the survey on the percentage difference in the performance of hand washing with soap between 1st graders and 7th graders. It was identified that the higher the grade, the more compliant the students were towards handwashing with soap. Results showed 34% among the 1st grade were compliant with the use of soap, while the numbers were increasingly different from the 7th graders which were 67%. The article on the

whole in its conclusion explained that more education and priority should be focused on multiethnic students. (Thanh & Hoat 2013.)

4 RESEARCH PROBLEMS

The purpose of this thesis is to study the possible problems with proper hand hygiene in reducing and preventing the spread of infections amongst students in the University of Applied sciences. The goal is to find out the amount of knowledge that both the nursing students and other students in the various departments have, although advantages of hand hygiene is obviously known and available information on the topic is easy to find, on hand hygiene. In addition, other goals descend deeper into finding possible ways to have the university students, mostly health care students, adhere to it. The research questions are:

1. Under what circumstances do students maintain hand hygiene?
2. Under what circumstances do students need to maintain good hand hygiene?
3. What is the knowledge and motivation that all students need to adhere to hand hygiene in order to prevent the possibility of being carriers of pathogens?

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5 RESEARCH METHODOLOGY

5.1 GEOGRAPHICAL LOCATION AND SETTING

The study was conducted in three major Centria university campuses which include the social and health department, business and IT department, and the cultural and tourism departments in Kokkola, Finland.

5.2 RESEARCH METHOD AND DATA COLLECTION

The research method chosen was a quantitative research method. Quantitative method in some cases is referred to as the empirical research method and it basically is the accumulation of numbers on a given data for analysis. This method of research is used by a range of intellectual fields and disciplines which comprise science, epidemiology and medicine. Depending on the kind and level of precision and incisiveness researchers collect or gather the numbers manually or automatically. (Balnaves & Caputi 2001.)

The main features of a quantitative research method are that normally the information collected is done suing a structured research instrument. The findings are based on bigger sample sizes which are symbolic to the observed population which in this situation would be the students in Centria University of Applied Sciences. Another feature is that a quantitative research method can be repeated due to its reliability and also the researcher has evidently clear research question to which unbiased responses are desired. Every part of the research study is thoroughly arranged before data collection is initiated. The data derived is in form of numbers and statistics, mostly arranged in tables, charts, figures, or in other forms without text. Various tools such as the use of questionnaires or computer software are ways the researcher uses to gather numerical data. (Babbie 2010.)

In the process of acquiring data, the use of experimental research was applied. Experimental research under the quantitative research methods indicates the manipulation of the variable under study and this is best explored by the random distribution of questionnaires or random selection of the study participants. Quantitative research can be segmented also in 2 parts which include the cross sectional and longitudinal research forms. Cross-sectional research entails the respondents being observed or questioned at one point in time whereas on the other hand with longitudinal quantitative research method the data is collected over a period of time. (Babbie 2010.)

The data was collected by preparing the questionnaires in English through the Webropol online survey tool and the link of the webropol online survey was sent to the various chosen campuses through the school's online e-mail portal system. A time frame of 2 weeks was planned to gather all necessary feedback and accurate response from respondents. Three campuses were chosen thereby the expected amount of respondents would possibly sum up to about 80 at the least. Successfully, an amount of 85 respondents were received. There was the expectancy of 10 respondents from each year group of both students studying in English and those in Finnish. There would be 10 from the first year students in which 5 go to the Finnish department and the other 5 on the English side, 10 from the second year student with the same division as the first year students, and 10 out of the final year students also with the same division summing up to a total of 30 respondents from each campus. An additional group would be added which includes students on exchange programs in the various campuses. A sum of 10 students would be taken at random and would receive the questionnaires to fill. Responses from the respondents were received differently. All questions were closed ended questions. The Theoretical background of the study was based on the criteria used which involves the limitation of the year of publication being in a range of 10 years, how relevant the article chosen was to the study topic, the reliability of the articles, and the key words chosen which were hand hygiene, knowledge, infection, and university students.

The questionnaire was made reliable by first being distributed to various individuals who included friends of the researcher from the same study institution, co-workers, formal apartment mates, and random chosen individuals. This gave a clearer understanding and a second view as to which direction the questions led to and how certain categories of people answered it. The diversity led to a simpler and direct questionnaire which aimed to bring out the main ideas and thoughts of the respondents. The questionnaire was revised 4 times and each time it was revised it was tested to determine how respondents would answer and if those answers were directed towards answering the research questions. In arriving on the final revised version of the questionnaire, it was tested and ready to be used.

The final version of the questionnaire was divided into four major categories. The first part was the demographic data which included questions about the respondents personal details but not too personal as to reveal specific identity. This included the age, gender, nationality or citizenry, year group, and degree program. The second part of the questionnaire was questions that brought out the basic level of knowledge the respondents had on hand hygiene. An example of one of the question was "Microbes on toilet doors, toilet seats and bathroom tap handles cannot cause ill-

ness" and the respondents were given answer choices as to strongly agree, agree, neutral meaning no knowledge on the asked question, disagree, and strongly disagree. The third part of the questionnaire was levelled with questions to display the respondent's personal behavior towards hand hygiene. Statements such as *"It is essential to wash my hands prior to eating."* were sent forth with choice answers of yes, no, sometimes, and rarely to depict the respondents behavior towards the given statement. The fourth part of the questionnaire was crafted to the respondent's source of knowledge on hand hygiene and how effectively the teaching and needed continuous knowledge of hand hygiene gets to them. Questions such as *"where do you learn or obtain current information about general hygiene?"* was used and answer options such as *Home, School, Medical facility, Friends,* and *State, if other* were given.

5.3 ANALYSIS OF DATA

The method used to analyzing the data was by means of the Webropol online survey tool system. Questions were on determining the knowledge and attitudes of student with hand hygiene. The questionnaire was in the form of the 3, 4, and 5 point Likert scale. With the 5 point likert scale 1 represents strongly agree, 2 represents agree, 3 represents neutral, 4 represents disagree, and 5 indicates strongly disagree. Other questions that consisted of the 4 point likert scale had the format that was 1 indication strongly agree, 2 being agree, 3 being disagree, and 4 strongly disagree. The Likert scale is a model of frequency scales which uses an unchanging form of choice formats which are constants and are developed to measure view points and attitudes. These digital scales calculate and determine the groupings of agreement or disagreement. (McLeod 2008.) Also other answering formats were used in the form of closed ended answers such as; yes, no, maybe, rarely, and sometimes.

5.4 RELIABILITY AND VALIDITY OF RESEARCH

Reliability is said to be the level to which a questionnaire or any measure of observation process generates equal findings even when used in a different setting or when repeated in different trials. The reliability indicates the consistency of scores after a period of time. (Miller 2012.)

In accordance with this knowledge, the questionnaire was orchestrated in a way as to be consistent in any trial. It was tested and tried in different settings to observe its reliability. This study will go to benefit students and other universities including the chosen setting by delivering measured in-

formation about the knowledge and compliance of university students in Centria UAS in Finland and what could be put in place to aid better the compliance of these students. The study will also bring to awareness the various loop holes in the sanitation scheme in various universities and how to fix them if there need be.

Validity is described to be the degree to which an apparatus records what it is meant to measure. It is the level which the tool chosen totally and completely measures or assesses the main topic of concern. The questionnaire being the researcher's tool of choice would be tested and tried a couple of times over and over again to review certain ambiguity, unclear language and comprehension, and also to be able to reach a level of acceptance as to what should be added or what question should be taken out at the final stage of developing the accurate instrument. (Miller 2012.).

The orchestrating of the questionnaire took several trials and errors. Various remolding and sharpening until the final version was reached. Questions were systematically arranged as to get the respondent's replies in separate sectors and also to aid in easy assessment and evaluation. This was done to receive the most accurate responses necessary to answer the research questions. Data received was handled appropriately and due to the chosen sample size and the diverse choice of research settings the findings would assuredly be valid. The study is said to be reliable due to the year limit chosen for the selection of articles. A maximum of 10 years interval related articles were used. The oldest articles used were by WHO and CDC whose definitions and guides are recommended world-wide and still in use regardless the age. The said found articles were also of relevance to my research topic and addressed my study topic. Furthermore, articles were taken from the school's data base which is well approved making it reliable and valid to be used. This thereby concluding the validity of information and data received.

5.5 ETHICAL CONSIDERATIONS

Majority of societies in its own way have legal guidelines that preside over individual behaviors, but in terms of norms they have a tendency to be more extended than that and also have a more informal descend than laws. According to David B, Resnik 2015, ethics in research can commonly be defined as *"**norms for conduct"*** that differentiate between acceptable and unacceptable behavior. There are various reasons why it is necessary and important to cleave to the ethical norms in research. (Resnik 2015.)

The aims of the research such as the prevention of error, truth, and knowledge are enforced, upheld and promoted by these norms. The process of reducing error and upholding truth is enforced once there is a disallowance of *"fabricating, falsifying, or misrepresenting research data"*. This keeps the authors in check not to break these binding rules. Also, in most research, there is the involvement of an immense amount of collaboration and or organization between numerous different individuals from different disciplines and institutions. The standards of ethics go to enforce those values which are important and vital to collaborative work. Such values include trust, accountability, mutual respect, and fairness. It is essential for any research that these values are maintained. These norms therefore center to guarantee that the researcher can be held accountable to the public. (Resnik 2015.)

Therefore, by these values, all data received was held in utmost confidence and in anonymity without revealing any personal information of the respondents. The researcher intends to maintain a high level of confidentiality with each response received kept anonymous. After all the data was gathered and collected the information of the respondents was deleted and cleared from any saved system to prevent exposure of personal information. This was done once all information and data were completely evaluated. Only in sudden terrible cases of memory drive theft or misplacement can the secrecy of the received data be compromised.

All statements and sentences derived from articles, publications and other sources where referenced accordingly and credit was given to all sources respectively in avoiding any form of plagiarism. Quotation marks were used when defining certain key terms and it was referenced as such.

6 FINDINGS

6.1 DEMOGRAPHIC DATA

The questionnaire was made reliable by first being distributed to various individuals who included friends of the researcher from the same study institution, co-workers, formal apartment mates, and randomly chosen individuals. This gave a clearer understanding and a second view as to which direction the questions led certain categories of people. The diversity led to a simpler and direct questionnaire which aimed to bring out the main ideas and thoughts of the respondents. Analyses of the demographic data of respondents were gathered

In critical analysis of the age range of the respondents, a conclusive age range of 18 years to 51 years old people were involved in the study. The age range group of 15 to 20years summed up to a number of 21 respondents. The group with ages 21 to 25 summed up to 45 respondents. The group of 26 to 30 years summed up to 8 respondents. Lastly, the group of 31years and older summed up to 12 respondents. The highest age range group was from the ages of 21 to 25 years and the lowest age range group was from 26 to 30 years. The difference scored between both age groups was a sum of 37 respondents. Figure 1 are the age range groups and 31 years and over was slightly higher than the age range year group of 26 to 30 with a difference of 4 respondents.

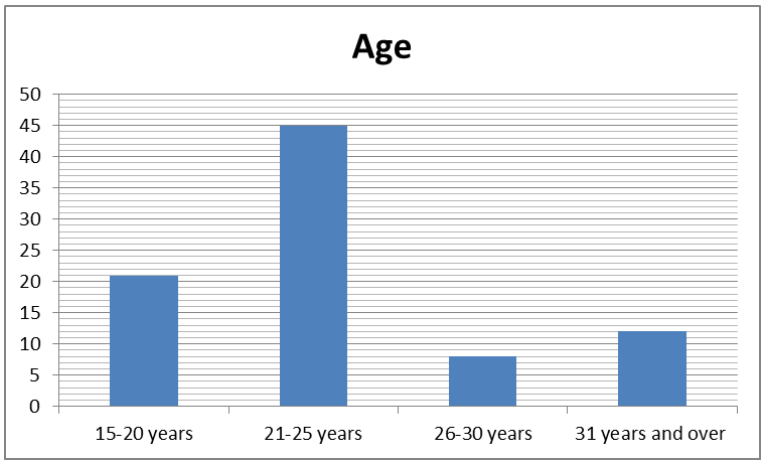

FIGURE 1. Age groups of respondents (n=84)

The majority of the respondents were females summing up to a number of 52 respondents. 31 of the respondents were males. There were 2 feedbacks from a transgender and the other respondent stated their gender to be *other*. The sum total difference of female respondents to male respondents was 21.

The nationalities of the diverse respondents include Finland, Vietnam, Russian, Poland, Kenya, China, Nepal, Ethiopia, Germany, Estonia, United States of America, UK/ Finland, Hungary, Mexico and France. A sum of 55 of the respondents were Finnish being the highest respondents, 8 were Vietnamese being the next highest in response rate with a difference of 47 as compared to the response rate of the Finnish respondents. 5 of the respondents were Russian, 3 were Polish, 2 Kenyans, 2 Chinese, 2 Nepalese, 1 Ethiopian, 1 German, 1 Estonian, 1 American, 1 United Kingdom Finnish, 1 Hungarian, 1 Mexican, and 1 French.

According to data results from the answered questionnaires the following includes the demographic data derived from the respondents from the study conducted. There was a total number of 85 respondents out of which 29 were 1st year students, 19 were 2nd year students, 16 were 3rd year students, and 17 were 4th year students, 1 accounted to be 5th year student, another one accounted to be 6th year student, 1 accounted to be a 2009 year group respondent or a 7th year student, and the last 1 respondent being a last year student. The majority of the respondents were 1st year students followed by a significant number of 2nd year students with a difference of 10 respondents. In table 1 are the results of the year groups of the respondents.

TABLE 1. Year group of respondents

YEAR GROUP	NUMBER OF RESPONDENTS
First year students	29
Second year students	19
Third year	16
Forth year	17
Fifth year and Sixth year	2
2009 year group or 7th year and Last year or final year	2

The following include the degree programs of the respondents; Business management, Industrial management, Information technology, Nursing, Social services, Chemistry/ Chemical engineering, Music pedagogy, Media technology, Electrical engineering, Humanities and education, Tourism, and Performing arts. Three of the respondents did not present a specific degree program under which they could be grouped, hence they were grouped under Non-specified. The non-specified group consists of Internship, Bachelor, and Engineering. Students from business management had the highest respondent rate whereas students from tourism and performing arts had the lowest response rate. There was a sig-

nificant amount of response rate from students in Industrial management having half the total amount of respondents of the Business management. Chemical engineering had half the total amount of the respondents in Industrial management. Media technology had half the total amount of respondents in Chemical engineering. In table 2 below one can find the results of the degree programs of the respondents.

TABLE 2. Degree programs of respondents

Business Management	24
Industrial management	12
Information technology	8
Nursing	7
Social services	7
Chemistry/ Chemical engineering	6
Music pedagogy	4
Media technology	3
Electrical engineering	2
Humanities and education	2
Tourism	1
Performing arts	1
Not_specified: Internship/Bachelor/Engineering	3

6.2 RESPONDENTS KNOWLEDGE ON HANDHYGIENE

After deriving and assessing all the necessary demographic data from the respondents questions were asked to derive answers that would enable the author to assess the knowledge level of the respondents concerning the topic of hand hygiene and infection prevention. Respondents were asked to indicate how much they agreed or disagreed with a series of statements. The first statement was that the use of hand disinfectant is better than hand washing with soap. Following the question of hand disinfectant being better than hand washing with soap, 2 of the respondents strongly disagreed, 21 respondents agreed, 24 of the respondents stood neutral on the idea, 30 of the respondents disagreed, and 8 of the respondents strongly disagreed. Figure 2 below shows the results of the feedback from the respondents.

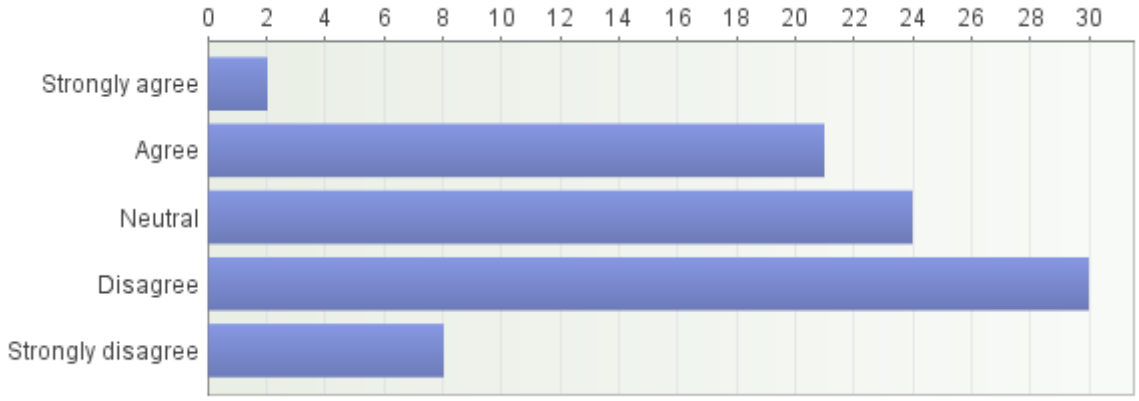

FIGURE 2. Respondent's response on hand disinfectant being better than handwashing with soap.

The second statement was that microbes on doors, toilet, and bathroom tap handles cannot cause illness. In view of this, data collected showed that 1 respondent strongly agreed to the statement that microbes on doors, toilet, and bathroom tap handles cannot cause illness. 3 of the respondents agree to the above statement. 7 of the respondents had no knowledge whether the statement of microbes on doors, toilet, and bathroom tap handles could not cause illness or whether these microbes at the mentioned places or areas could cause illness and chose to be neutral. In other view their response could also mean they both agree and disagree to the statement in some cases. 34 of the respondents disagreed to the statement as being false. There by agreeing that microbes located at these various places, being the doors, toilet and bathroom tap handles, can cause illness. Also, 40 of the respondents had a stronger conviction and strongly disagreed to the statement that posed that microbes located on those locations cannot cause illness. In figure 3 below shows the results of the response derived from the respondents.

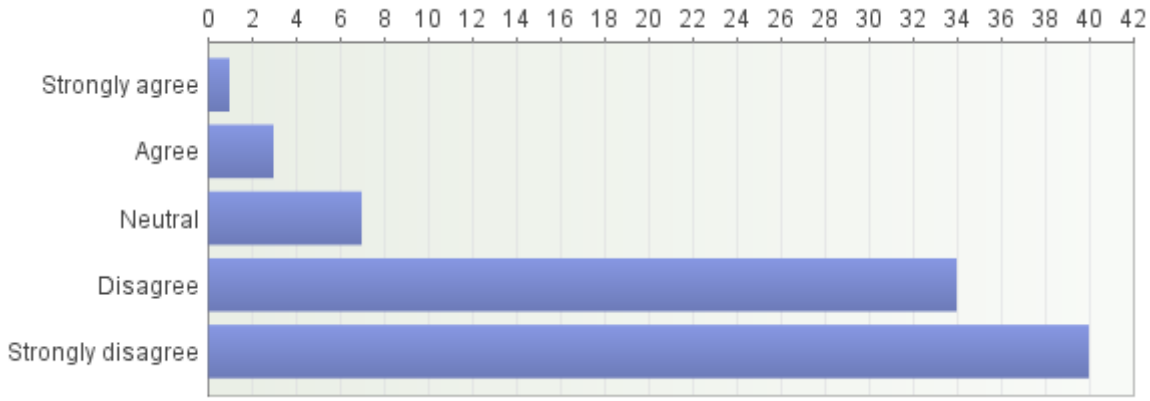

FIGURE 3. Respondent's knowledge on the statement that microbes on doors, toilet, and bathroom tap handles cannot cause illness.

The third statement used as a tool to determine the respondent's level of knowledge of the subject of hand hygiene was that proper hand hygiene prevents the spread of severe infections like Cold, Noro-virus, Hepatitis A and viral meningitis. The table below indicates 85 responses out of which 22 of the respondents strongly agreed to the statement that proper hand hygiene prevents severe infections like cold, Noro-virus, Hepatitis A and viral meningitis. A number of 45 of the respondents also agreed to the above statement being true. 11 of respondents stood neutral stating they either had no idea of the related statement or were not sure of it. Furthermore, 5 of the respondents disagreed with the statement and 2 strongly disagreed with the statement. Figure 4 below displays the results from the respondents on the statement made.

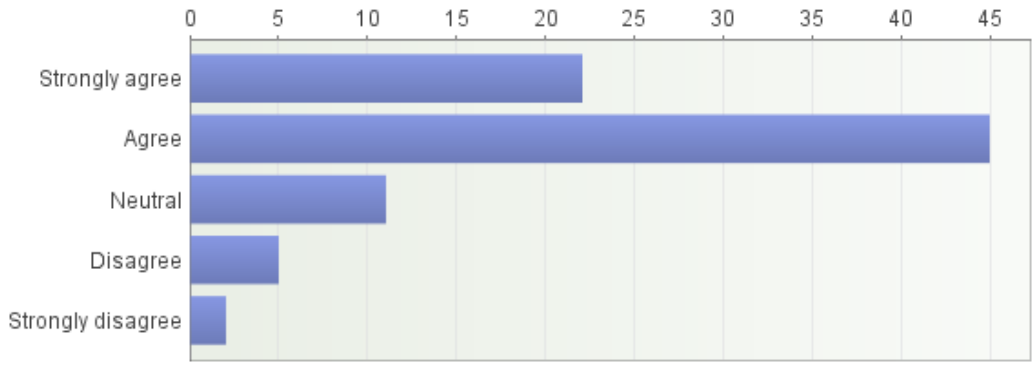

FIGURE 4. Respondent's knowledge on the statement that proper hand hygiene prevents the spread of severe infections like cold, Noro-virus, Hepatitis A and viral meningitis.

The next tool used in testing the respondent's knowledge on hand hygiene was the question *"What is the minimal time needed for alcohol-based hand rub to kill most germs on your hands?"* With the knowledge of what the minimal time needed for alcohol-based hand rub to kill most germs on the hands, 40 respondents chose a minimal time of *20 seconds* for alcohol-based hand rub to kill most germs on the hands. A number of 4 of the respondents chose that it takes *3 seconds* for the alcohol-based hand rub to kill germs from the hands. 9 of the respondents indicated that it takes *a minute* for the alcohol-based hand rub to have effect on killing most germs on the hands. 24 of the respondents settled on the answer that *10 seconds* for alcohol-based hand rub to kill germs from the surface of the skin was more accurate. Lastly, from feedback of the questionnaire, 8 of the respondents chose *5 seconds* to be the minimal time it would take for the alcohol-based hand rubs to kill germs from the hands. Figure 5 below exhibits the respondents' answers to the question.

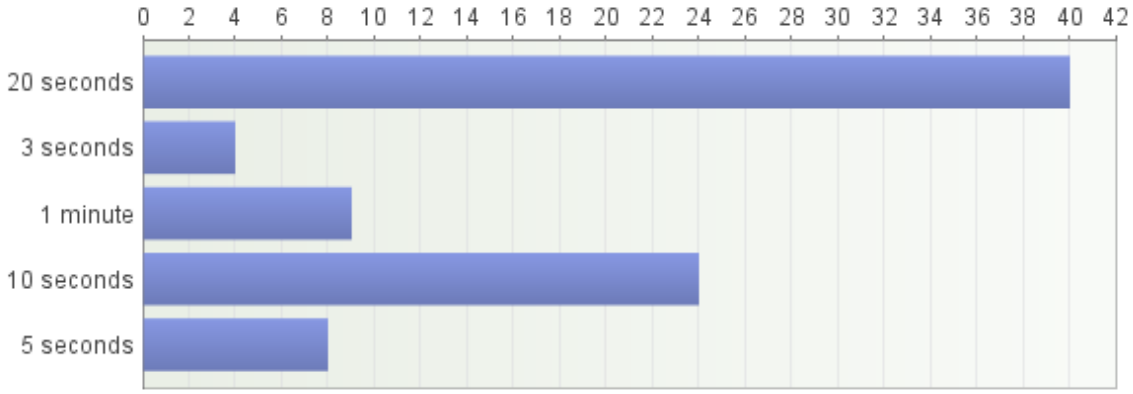

FIGURE 5. Respondent's replies to the question "*What is the minimal time needed for alcohol-based hand rub to kill most germs on your hands?"*

6.3 RESPONDENTS BEHAVIOUR TOWARDS HAND HYGIENE

In this section the respondent's behavioral pattern towards hand hygiene was assessed through a series of questions to determine their actions pertaining to hand hygiene when in such situations. Respondents were asked if it was essential to wash hands prior to eating or dining. After critical analyses of the findings, it was discovered that 52 of respondents answered *yes* it is essential for individuals to wash hands prior to eating and dining, 2 of the respondents answered *no* it is not essential to wash hands prior to eating or dining, 23 chose *sometimes* hands are washed prior to eating or dining and 2 also claimed they *rarely* wash hands prior to eating or dining. Figure 6 below displays the results of the collective answers given by the respondents.

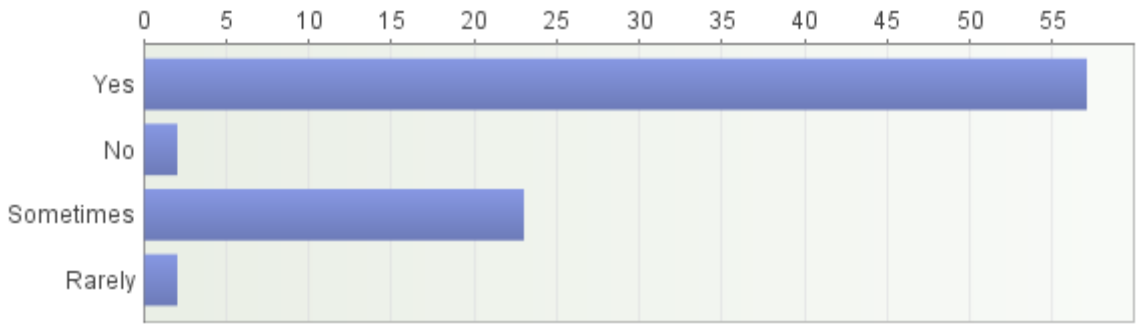

FIGURE 6. Respondent's responsse to the question whether it is essential to wash hands prior to eating or dining.

Secondly, a statement stating that "Washing hands after eating or dining is very important to me." was the next tool used in assessing the respondent's behavior towards hand hygiene. The respondents were

given the options of *yes*, *no*, *rarely*, and *sometimes* to choose from. According to the data, 20 respondents answered *yes* to the question of hand washing after eating or dining is very important to them. A number of 23 students viewed this point differently and chose *no* to the same question. 28 of the respondents answered that they *sometimes* wash hands after eating or dining. In addition is the last group of 14 respondents whose chosen answer states that they rarely wash hands after eating or dining. Figure 7 below indicates the results of the collective answer of the respondents.

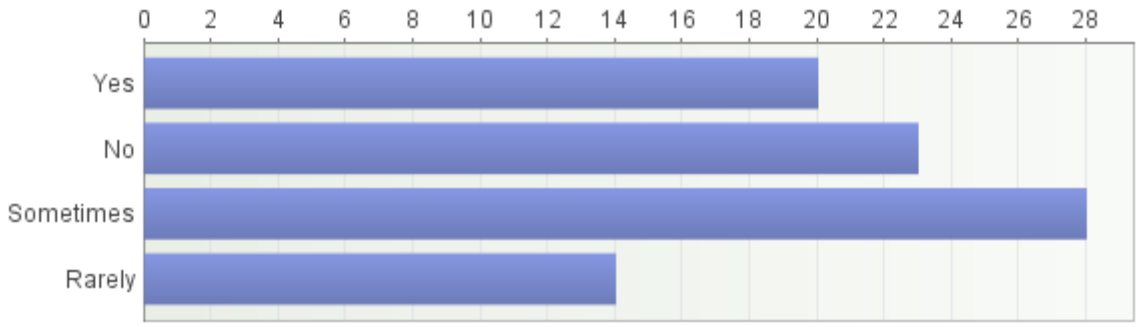

FIGURE 7. Respondent's answers to the statement whether washing hands after eating or dining is very important.

In addition, another statement used as a tool to assess respondent behavior towards hand hygiene was *"Do you wash your hands after you have been in the rest room?"* From data collected the majority of the students or respondents answered yes to the question. The total number of respondents answering yes sums up to 75. On the other hand 4 respondents answered "No" saying they do not wash hands after they use the rest room. Another set of 4 respondents claim that they sometimes wash hands after they use the rest room. Out of all the students or respondents only 1 student answered that they rarely wash their hands. Figure 8 below displays the sum of answers from the respondents.

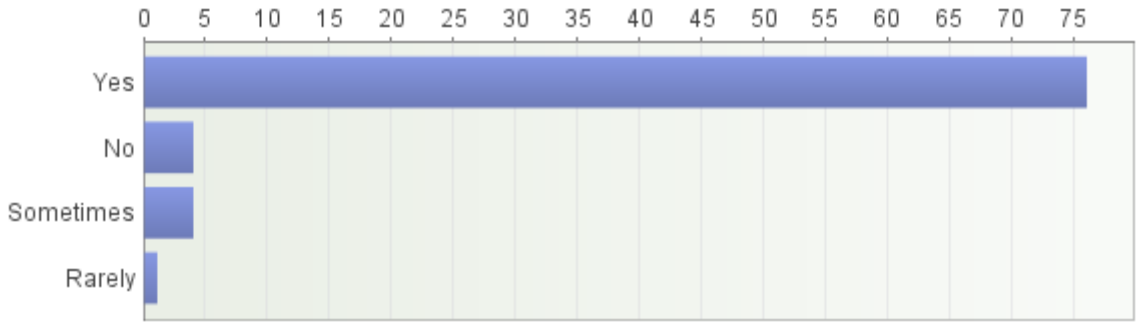

FIGURE 8. Respondent's responses to the question "*Do you wash your hands after you have been in the rest room?"*

With similar options of *yes, no, sometimes* and *rarely*, respondents were asked the question "do you cover your mouth when coughing?" According to the data received, 76 respondents chose yes to the question. 3 of the respondents answered that they do not cover their mouths when coughing. Also a number of 5 students answered that they sometimes cover their mouths when they cough. Figure 9 below accurately displays the feedback of the respondents.

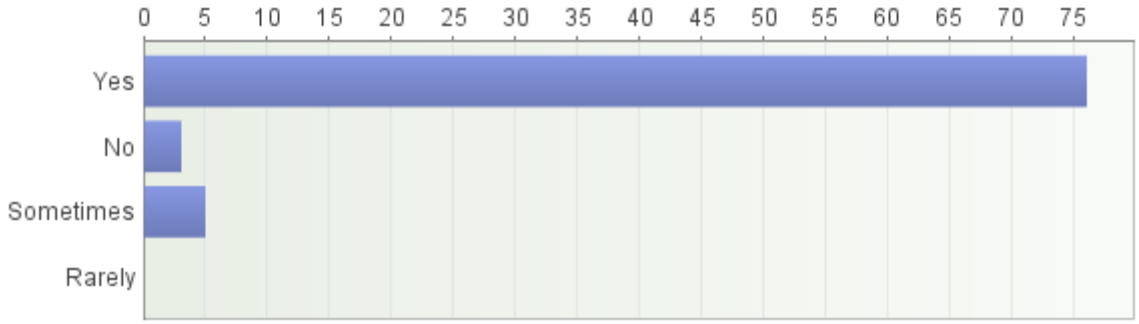

FIGURE 9. Respondent's answers to the question whether they cover their mouth when coughing.

Furthermore, information derived from the data gathered identifies a number of 71 respondents who stated *yes* to the question whether they cover the nose when sneezing. A number 3 respondents claimed they do not cover their nose when they sneeze. 10 of the respondents answered they sometimes cover their nose when they sneeze. 1 out of the 85 respondents answered that he/she rarely covers his/her nose when they sneeze.

Moreover, with the question of whether respondents wash their hands after coughing, results from the data received shows that 16 respondents chose "yes" to washing hands after coughing, 13 chose "no" to hand washing after coughing, 46 respondents said they sometimes wash hands after they cough, and 10 of the respondents chose that they rarely wash their hands after coughing. Figure 10 below shows the results of the response.

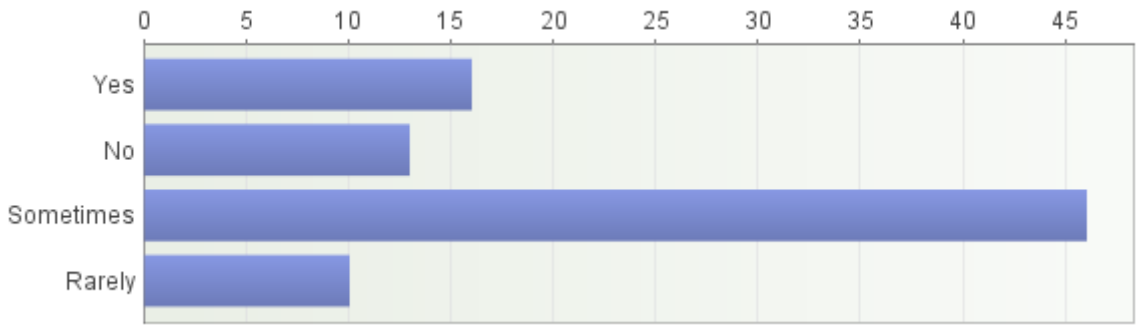

FIGURE 10. Respondent's replies to whether their hands are washed after coughing.

On the question of whether the students of the university would stay at home in cases where they had flu or diarrhea, 38 of the respondents answered "yes" that they would stay home when they have such illness. The number of 5 respondents selected "no" meaning they would not stay home. The sum of 38 respondents selected "sometimes" as their answer which goes to tell that they might stay home or be in school depending of certain degree of the illness or other reason unstated. 3 of the respondents answered that they would rarely stay home in any instance where they have flu or diarrhea.

In measuring the respondent's adherence to washing hands before eating, the question *"Do you always wash your hands with soap before eating?"* was used the tool in retrieving that data. 29 of the respondents answered "yes" to the question. 13 of the respondents answered "no" they never wash their hands with soap before eating. 33 of the respondents answered they "sometimes" wash hands with soap before eating. 9 of the respondents answered that they rarely wash hands with soap before eating which also means on few occasions they do wash their hands with soap before eating. Figure 11 below displays the results of the answers given by the respondents.

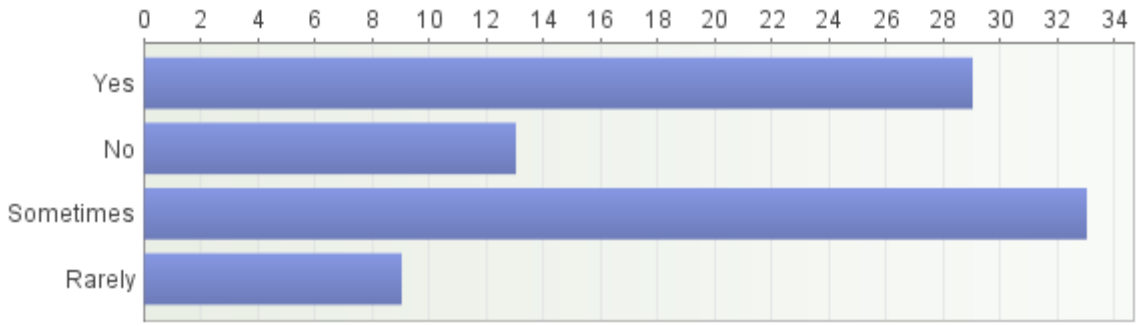

FIGURE 11. Respondent's responses to the question *"Do you always wash your hands with soap before eating?"*

6.4 RESPONDENT'S KNOWLEDGE ON PERFORMING HAND HYGIENE

In this section of the findings data was collected from given statements used as tools of which they had the option of choosing yes, no, and no idea in identifying respondent's knowledge in performing hand hygiene. The statement *"I dry between my fingers and palm when washing my hands."* was given with the available options. 55 of the respondents answered yes that they dry between their fingers and palms when washing their hands. A sum of 13 of the respondents answered no to drying between fingers and palm when washing the hands. Other respondents summing up to a number of 15 answered no idea to the statement which goes to tell they do not perform that practice or do not perform it in that manner.

Secondly, the statement *"I use the same paper for drying my hands to close the tap."* was given with the same answer options as the previous question which was *yes, no* and *no idea*. On the statement of the usage of the same paper for drying the hands in closing the tap a number of 22 respondents answered yes. On the other hand 50 of the respondents answered no to the statement claiming they do not use the same paper for drying their hands to close the tap. 13 of the remaining respondents answered that they had no idea to the matter at hand.

7 DISCUSSIONS AND CONCLUSIONS

7.1 DISCUSSIONS

Hand hygiene is the active process of practically performing hand washing, antiseptic hand-wash, and alcohol-based hand rub. It is also described to be the efficient yet short rubbing of all surfaces of the hands with lathered soap which is then followed with rinsing and cleansing under flowing streaming water. (CDC 2009.)

The determining purpose of the study was to ascertain the connected amount of knowledge that both the nursing students and other students in that university of applied sciences have although advantages of hand hygiene is obviously known and available information on the topic is easy to find. The predominant goal of the research work is to study the possible problems with proper hand hygiene. In addition, reducing and preventing spread of infections amongst students in the University of Applied Sciences. In achieving this it became necessary to grasp an understanding of the knowledge of the students in the University related to proper hand hygiene. In order to gain a full scope of the level of knowledge of the University students it was important to develop a layout to embody all departments, year level, age, gender, and nationality.

The research method chosen was a quantitative research method and this method of research is used by a range of intellectual fields and disciplines which comprise science, epidemiology and medicine. Depending on the kind and level of precision and incisiveness researchers collect or gather the numbers manually or automatically. In the case of this research the numbers were gathered automatically. (Balnaves & Caputi 2001.)

Data was collected through the sending of questionnaires in English to the various chosen campuses with the help of the Webropol online survey tool utilized through the school's online e-mail portal system. Questions where sent to students of COPSA and exchange students and 84 responses were received. All questions were closed ended questions. The Theoretical background was based on the recommended criteria which was used and this involves the limitation of the publishing year being in a range of 10 years, how relevant the article chosen was to the study topic, the reliability of the articles, and the key words chosen which were hand hygiene, knowledge, infection, and university students. Hence questions made were supported by relevant articles. The students were asked questions about their age, gender, nationality, year of study, and degree program.

Le Thi Thanh and Luu Ngoc Hoat, 2013 had a study on the topic handwashing among school children in an ethnically diverse population in northern rural Vietnam. The aim of the study was on describing hand washing behavior and compliance to hand washing with soap in Vietnam. The article on the whole in its conclusion explained that more education and priority should be focused on multiethnic students although it is necessary that education and motivation for compliance to handwashing is encouraged to all students. (Thanh & Hoat 2013).

In order to know the level of knowledge the students had or knew on hand hygiene certain questions were used to derive these answers. All respondents were asked on how much they agree, disagree, or are neutral on the statement that the use of hand disinfectant is better than handwashing with soap. The number of students who disagreed or strongly disagreed with this statement summed up to 38 out of 85 respondents which is less than half of the students who participated. 24 of the respondents had no idea on the posed statement and stood neutral whereas 23 respondents agreed or strongly agreed. This explains that very few students in the university fully understand the functions and effectiveness of the available hand hygiene products and procedures in the university. Hand washing with soap and water is always preferably more efficient in removing and reducing the amount of microbes on the hands. It is more effective to perform both hand hygiene and use antiseptic alcohol base hand rubs. The use of alcohol hand sanitizers is mostly implemented when there is no soap and water. There are other instances that hinder the individual's ability to perform hand washing with soap and water. The use of alcohol hand based disinfectants containing 60% alcohol is used in such cases. (CDC 2016).

They were also asked to show how much they agree, disagree or stand neutral on the statement that microbes on doors, toilet, and bathroom tap handles cannot cause illness. 74 respondents out of 85 disagreed or strongly disagreed to the statement. This indicates that a larger amount of the respondents understand the concept of how microbes can be transferred from inanimate objects or surfaces to other individuals causing illness. 11 of the respondents stood neutral, agreed, or disagreed to the statement. This goes to tell that although the majority of the population understands the basic way microbes are transferred there still exist a small group of individuals lacking that knowledge. Indirect contact involves the contracting of infection by means of coming in contact which inanimate object infected with the bacteria. These inanimate objects may include pencils, handkerchiefs, cutleries, door knobs, tables, chairs and other surfaces that have been contaminated by infections such as the influenza virus and the common cold. The fourth way of being infected is by coming in contact with contaminated blood with illness such as HIV AIDS, Hepatitis B, and Hepatitis C. The fifth is by eating or swallowing contaminated food or water in cases of food poisoning. (PHMCDG 2014).

The respondents were further asked to choose how much they agree, disagree or choose to be neutral on the statement that proper hand hygiene prevents the spread of severe infections like cold, noro-virus, Hepatitis A, and viral meningitis. 67 of the respondents agreed or strongly agreed to the given statement indicating more than half of the participants knew and understood the effectiveness of hand washing in preventing these illnesses. 18 out of 85 respondents disagreed, strongly disagreed, or stood neutral to the statement. Although the numbers of students lacking this knowledge is indicated to be small, it is still essential to further educate students on the effectiveness and necessity to keep good hand and personal hygiene. Viral meningitis is when the covering layer of the spinal cord and the brain gets infected by certain types of virus normally related and in connection to gastroenteritis. Respiratory secretions such as cough droplets, sneeze droplets, running nose, drooling mouth, or spitting are means by which the virus spreads amongst human beings. Faeces are also another means of spreading the virus since the virus can exist in the faeces of an infected individual. Symptoms of an infected person may include headache, fever, vomiting and others. Hand hygiene and good personal hygiene is noted to be one of the best ways to prevent the spread of the viral meningitis. (SAH 2012).

Moreover, they were asked what the minimal time needed for alcohol-based hand rub to kill most germs on the hands was. The responses to these questions assisted the author gain base line information on the knowledge level of the participants. 40 of the respondents chose the correct and the remaining 45 respondents chose wrong answers. More than half of the participants lack the knowledge on the given statement. This could indicate that most of the participants wrongly apply the alcohol hand rub. The given answer choices were 20 seconds, 3 seconds, 1 minute, 10 seconds, and 5 seconds with the correct answer being 20 seconds. Respondents were asked if it was essential to wash hands prior to eating or dining with the response options of yes, no, sometimes, and rarely. Using the same response options, they were asked if washing hands after eating or dining was very important. They were asked if they wash hands after being in the rest room. This part of the questionnaire was to derive information on the participant's behavior during these situations. Majority of the participants answered yes or sometimes to these questions. There were others who did not see the necessity to wash hands before and after eating, or after using the rest room.

Respondents were also asked if they covered the mouth when coughing. They were asked if they covered the nose when sneezing. The next question was whether they washed hands after coughing. In advancing they were asked whether they stayed at home when they had a flu or diarrhea. The follow up question was whether the respondents always washed hands with soap after covering the mouth or

nose when coughing or sneezing, or staying at home during flu or diarrhea episodes. Majority meaning more than half of the respondents answered yes they did wash hands after these practices. Although the numbers of for those participants who do not perform hand hygiene in such situations are small they still pose a threat in public health view in cases of outbreaks. Such individuals would further increase the rate of the spread of infection in outbreak situations if information, education and motivation are not given to enforce self-adherence. An article by Taylor et al. (2010) was about Hand hygiene knowledge of college students. The purpose of the study was to observe and estimate the behaviors of students related to their hygiene conducts in the fields of their study courses, gender, and understanding towards hygiene. A number of 100 students were experimented on at random in 10 different restrooms in the university to ascertain if these students in reality washed their hands. The study was split into 3 examinational categories to acquire the required feedback. These included a platform where the students would be observed, made questions in the form of quiz to determine the knowledge field of the students about hand hygiene and how pathogens are spread, and an investigation of personal illness rates. The results of the study proposed that amongst the number of student that went into the various restrooms females had the tendency to wash their hands more often as compared to males. Also, it was noticed that students in the science majoring fields had a higher probability in washing their hands than non-science majors. Further findings went on to show that students who rarely washed their hands after using the rest room reported sick more often as compared to those who were regular in washing their hands each time they visited the restroom. (Taylor et al 2010.)

The respondents were asked if they dried between their fingers and palms when washing their hands with the response options of yes, no, and no idea. A total of 55 participants answered yes notifying that more than half of the respondents were aware of the need for drying between the fingers and palms during hand washing. 13 answered no to the question indicating they had no clue what the purpose of drying the fingers and palms were. 15 respondents answered *no idea* which indicates that 28 participants out of 83 did not know the right way hands are properly washed and dried. Respondents were asked if they used the same paper for drying their hands to close the tap. 50 responded by answering no while 22 answered yes. 13 of the respondents' answer was *no idea*.

The respondents, with response options of a yes or no, were also asked if there was the feel of concern to inform school colleagues to perform hand hygiene when they failed to do so in most circumstances. Majority of the respondents summing up to 52 participants answered no they did not have that need to remind friends or colleagues to perform hand hygiene when they failed to do it. This could indicate that majority of the students in the university are either scared or shy to correct others on the perfor-

mance of hand hygiene or they simply do not see the necessity to assist others adhere to performing hand hygiene. A sum of 31 respondents which is less than half of the sample population answered yes to the question. The attitude of reminding, assisting, informing, and educating friends and colleagues in situations where hand hygiene is forgotten or overlooked is needed. A survey by Barrett and Randle (2007) about "Hand hygiene practices: nursing students' perceptions". The aims focused on the perceptual knowledge student nurses had towards hand hygiene practices in a clinical environment. The objective of the study was to find out the things that affected the perceptions of these students and other individuals' adherence to hand hygiene. A qualitative interpretive design method was used and 10 students took part in the study. Results of the study revealed that the perception of the student of things which hindered the compliance to hand hygiene were less time, being too busy, clinical procedures, skin condition, lack of knowledge, and glove use. The authors went on to state that the perception most of the students had were seeing the other health care workers as an influence in compliance to hand hygiene because of the idea of "fitting-in" with the health workers in the clinical area. It should not be underestimated how influential other health care workers are as role models. (Barrett & Randle 2007.)

Participants were further asked if they felt positive about doing proper hand hygiene. 80 responded yes and 4 responded no. It is an obvious indicator that majority of the participants agree on the benefits and preventive measures proper hand hygiene serves to be. They were further asked if hand washing was a habit. 70 of the respondents answered yes, 15 stood neutral, and 1 strongly disagreed. These series of question were to identify the respondent's personal stand towards hand hygiene. In sequence of the answers given it is known that majority if not all of the respondents are in accordance to maintaining proper hand hygiene. The students were asked to choose how much they agree, disagree or are neutral on the statement that sometimes they miss out hand hygiene simply because of forgetfulness. 29 agreed and 1 strongly agreed. This goes to tell that forgetfulness is one of the factors where individuals fail to maintain hand hygiene. 21 respondents stood neutral indicating that hand hygiene is not hindered due to forgetfulness only but for other reasons as well. 22 respondents disagreed and 12 strongly disagreed. This reveals that 33 of the participants are not hindered to perform handwashing as a result of forgetfulness.

Respondents were asked how many seconds or minutes they use in washing hands after using the bathroom. Out of the available response options, 10 of participants chose 1-5 seconds, 31 answered 6-10 seconds, 32 responded with 11-30 seconds, 11 chose 30 – 60 seconds, and none of the respondents selected the answer 1-3 minutes. Although hand washing may seem to be an easy task but certain measures are essential to follow in order to decrease the amount of microbes on hands in preventing

infection. The steps necessary to be followed include first to take away any rings or bracelets from the wrist or fingers and wet the hands water. Then soap is added and all folds and surfaces of the hands including the back of the hand nails must be lathered and cleaned with the soap for not less than 15 seconds. The hands are then rinsed under flowing water in a rubbing movement. Once all visible foam or slippery soapy feeling on the hands is off, dry hands gently to prevent breaking the skin with paper towel or any clean towel. The tap is then turned off using the paper towel to prevent recontamination of your fingers after wash. In cases where public restrooms are used the paper towel can be used to open the door on your way out after washing hands. (Health Canada 2009).

Participants were asked how often they wash hands during a school day. In tally with the response options, 10 respondents answered *once*, 46 answered *twice*, 26 of the respondents chose more than *5 times*, 1 respondent chose more than *10 times*, and 2 of the respondents answered that they did not wash their hands during a school day. This indicates that majority of students perform hand washing at least once during a school day. It is a good indication and must be encouraged further. The respondents were asked what they turned the bathroom tap off with after washing hands. The given options were paper, wet clean hands, and dry clean hands. 27 of the respondents chose paper, 47 chose wet clean hands, and 9 chose dry clean hands. All the given answers are possible but the act that prevents recontamination of washed hands is by using paper to turn the bathroom tap off. This establishes the fact that there is a need for more education on hand washing practices. It is obvious that majority of the students in the university know that hands need to be maintained at all times and do adhere to it sometimes. Although this is true the hand washing process needs to be taught properly so students do not recontaminate themselves and environment after washing hands. Taps are turned off using the paper towel to prevent recontamination of your fingers after wash. In cases where public restrooms are used the paper towel can be used to open the door on your way out after washing hands. (Health Canada 2009).

The study population was asked in the questionnaire how often they get affected by a listed group of illness which includes fever, diarrhea, flu, cough, or sore throat. The given response options included “frequently, once or twice a month, once every 3 months, once every 6 months, and rarely”. 3 of the respondents answered they frequently fall ill with one or more of those illnesses. 5 of the respondents answered they fall ill once or twice a month with one or more of the listed illnesses. 16 respondents answered they fall ill once every 3 months with one or more of those illnesses. 24 respondents answered once every 6 months do they fall ill with one or more of those illnesses. 37 respondents answered that they rarely fall ill with the listed illnesses. This means in every 3 months 24 of the re-

spondents fall ill with either one or more of the listed illnesses. It also indicates that within 6 months 48 of the respondents fall ill with the above listed illnesses which is more than half the number of participants. In accordance to the report, in every semester there is an approximation of half the population on the university campus falling ill with the illnesses listed and this could be problematic if those who fall ill do not maintain good hand and personal hygiene. The spread of these illnesses are rapid in cases of cold, flu, or cough since they are airborne. According to results of the study by Taylor et al. (2010) on Hand hygiene knowledge of college students, students who rarely washed their hands after using the rest room reported sick more often as compared to those who were regular in washing their hands each time they visited the restroom.

The respondents were asked whether the university, Centria University of Applied Sciences, organizes seminars or educate proper hand cleaning techniques occasionally with response options of yes or no. 21 of the respondents answered yes whereas 64 of the remaining respondents answered no. This indicates that either there is a lack of proper education to all units of the university or the information on education is not given out properly hence the information does not reach the students. It could also mean that the students are not motivated to attend or participate in such seminars or lessons if they are held leading to fewer students participating in such educational events in the university. Another indication could be that Nursing students are more interested to attend as compared to students from other fields of study such as engineering, business, IT and others.

The students were asked where current information about general hygiene is learnt or obtained from with response options of home, school, medical facility, friends, or if other places it needed to be stated separately. 43 of the respondents answered that they receive current information on hand hygiene from home. This could be from parents, siblings, television at home, or from newspaper delivered home. 16 respondents answered that they got their information from school which could be either from lectures, seminars, or posters in the school. 7 of the respondents answered that they got their information from a medical facility. 1 of the respondents said he got information on general hygiene from the friend. There were 17 of the respondents that chose answer option *other*. The list of other sources of information on hand hygiene that these respondents gave included bathroom posters practically anywhere but most commonly in schools and hospitals, with the internet which is accessible anywhere, by oneself, relationship partners (*my boyfriend)*, from work, from parents which means at home, by common sense, personal study, and through the media.

Finally, the respondents were asked if there was always the availability of hand sanitizers and soaps at the designated places in the school with response options of yes, no, seldom, and not aware. 61 of the respondents answered yes to the above statement, 3 answered no, 10 answered seldom, and 11 answered that they were not aware. In behalf of the survey, instruments were generated for the study, and data were gathered which concentrated and tackled the research problems posed. The data received indicates that majority of the population of the participants are aware of the availability of hand sanitizers and soaps on campus at various points. 24 of the other respondents either do not know where to look or are not aware of the functions of the advanced hand sanitizer and soap containers or cases.

A survey on the inspections of hand washing supplies and hand sanitizer in public schools by Ramos et al. 2010 was undertaken for a similar cause. This study was performed to identify and measure the frequency at which hand washing materials such as soap, paper towels, and hand sanitizers were being supplied in the public schools. A setting of 10 school districts which were grounds for 93 schools was taken as participants for the inspections undertaken by the school nurse. According to the survey, in November 2008, 90 schools submitted their results of the inspection performed and this made up 97% of returned feedback from all 10 school districts. Information gathered from the total 697 bathrooms showed that 88.8% of them had soap and 91.7% had paper towels and hand dryers for getting hands dry after hand washing is performed. Feedback received on hand sanitizer in bathrooms was 1.2% and 15.25 in school cafeterias. No observations were made in terms of male or female bathrooms neither were they distinguished within primary or secondary schools concerning the supply of soap, paper towels or hand dryers. It was concluded that alcohol-based hand sanitizers in the school bathrooms were accounted infrequently. Whereas hand sanitizer in a regulated location such as school cafeterias were not often accounted for and hence needs to be promoted. (Ramos et al 2010.)

Finding articles on hand hygiene and infection prevention in hospitals, health centers and elderly homes was easy since they were related to nurses. Finding articles on hand hygiene in relation with students in the university seemed quite a difficult task. This was because there are very few previous articles to gain knowledge from relating to hand hygiene promotion in universities. Most articles found where those of elementary schools and secondary schools. Few articles on university campuses are available and this makes this research work one of its kind. It would further go to benefit other researchers who would find interest in looking into the topic further to get previous studies on similar topics. It would also go to help the students and school body identify the minute problems with hand hygiene in the university.

Due to various limitations in the author's personal life it led to delay in the process management. Although the study delayed, the information derived is of great use and importance, and remains very reliable. The author through the research process has gained a great deal of knowledge pertaining to hand hygiene which he uses in his personal life to prevent the spread of illnesses to family, colleagues and all others around. The information in the study goes to benefit the students in the university and can also benefit any student since it gives general important information on hand hygiene in general and the prevention of infection in universities.

The first research question stated was under what circumstances students in the UAS Centria maintain their hand hygiene. The answer was derived from the questionnaire which indicated that majority of the students in the university washed hands prior to eating and after eating. The results from the questionnaire also indicated that majority of the participants washed their hands after using the rest room. Majority of the respondents stated that hand washing is a habit but from the results of the questionnaire it was noted that although most of the students understand the importance of hand hygiene majority lack informed methods and procedures in performing proper and effective hand hygiene in the prevention of infection.

The second research question stated was under what circumstances do the students need to maintain their hand hygiene. On a regular day, certain activities require an individual to perform hand hygiene. These activities include changing a baby or elderly diapers, using the toilet, before and after handling food, after sneezing, coughing, or blowing nose, after taking care of someone who is ill or being around them, after throwing garbage away, and after smoking. (SAH 2012). Furthermore, there are certain situations and moments in which hand hygiene must be maintained at all cost. Judgement on whether to wash hands in these moments depends on the individual. In situations where there is an instinctual or real danger of transferring microbes from one point of contact to the other by aid of the hands must be assessed by the student since the individual at most times know what he or she has come in contact with during school hours. Having contact with contaminants from infected environment is one of the reasons that leads to the moments when an individual needs to clean the hands by proper hand washing and using alcohol hand rub to prevent carrying harmful pathogens from the hands to other surfaces and objects in the university environment (WHO 2006). Another instance is when there is contact with body fluids such as urine or blood. Hands then must be washed clean and disinfected to prevent spreading any microbes and this is to protect the individual and the school environment from contamination. (WHO 2006).

7.2 CONCLUSIONS

Storr and Clayton-Kent (2004) carried out a study on hand hygiene. The main aim was to deliver unto the reader an evaluated result of the way hand hygiene practice can be boosted to get most individuals to comply. The article was to explain further on the reasons related to the low level of adherence to hand hygiene policies. The author recommended systematic approaches in aiding individuals adjust to occasional performance of hand hygiene in order to prevent spread of infections. The article explained certain barriers that hinder effective hand hygiene. These barriers include "*Skin problems caused by hand hygiene products, insufficient education; Lack of access to facilities to clean the hands. Individual attitudes, beliefs and behavior do not support hand hygiene. Lack of role models in the working environment, Lack of management or organizational support, Workload and activity levels do not support hand hygiene. (Storr & Clayton-Kent 2004.)"*

According to the data received through the questionnaires that were conveyed, students in the university maintained their hand hygiene under three circumstances. These circumstances include maintaining hand hygiene prior to eating or dining, and maintaining hand hygiene after using the restroom. A considerable amount of the students responded that they maintain their hand hygiene prior to eating or dining. A number of 57 out of 84 respondents answered yes which was more than half of the respondents. This goes to show that majority of the student population are conscious about washing hands and maintaining good hand hygiene before eating. There are situations and moments in which hand hygiene must be maintained at all cost. These moments are situations where there is an instinctual or real danger of transferring microbes from one point of contact to the other by aid of the hands. Having contact with contaminants from infected environment is one of the reasons that leads to the moments when an individual needs to clean the hands by proper hand washing and using alcohol hand rub to prevent carrying harmful pathogens from the hands to other surfaces and objects in the university environment (WHO 2006). Another instance is when there is contact with body fluids such as urine or blood. Hands then must be washed clean and disinfected to prevent spreading any microbes and this is to protect the individual and the school environment from contamination. (WHO 2006). On a regular day, certain activities require an individual to perform hand hygiene. These activities include changing a baby or elderly diapers, using the toilet, before and after handling food, after sneezing, coughing, or blowing nose, after taking care of someone who is ill, after throwing garbage away, and after smoking. (SAH 2012).

It is advised that further education, encouragement and motivation needs to be implemented to get a much higher amount of students to comply to hand washing. Although a majority of the population of students answered yes to washing hands prior to dining it is still necessary that it is enforced into the attitudes of all students. A study on the proper hand washing practices among elementary school students in Selat Nasik-district Indonesia by Setyautami et al. 2011. The study noted that 9 groupings related to hand washing surfaced which connected students washing hands with the use of soap and water in connection with 2 significant incidents. These incidents include moments before the students had to eat and moments after using the restroom. Findings of the study indicated that only a percentage of 40.5 of the respondents performed proper hand washing. It was observed that the obtainability or accessibility of clean water and soap being available at hand washing posts were viewed to be substantial predictors of washing hands properly in occasions when adapted with other influences. The results of the study showed that there was a very low occurrence of proper hand washing amongst the elementary students and hence there is a need of more effective hand washing promotions in schools and the need of better services to boost the prevalence on the right way of washing hands among the students. (Setyautami et al 2011.)

In regard to the information derived from the questionnaire, a high percentage of the students are informed on circumstances where hand hygiene needs to be maintained. Data showed an amount of 57 students who agreed to washing hands prior to eating or dining which is a positive sign of good hand hygiene amongst the students and ought to be maintained. Maintaining good hand hygiene after eating is also essential but it most depends if the student's hands, during eating or dining, came in contact with any food or fluids. Students are also advised to maintain their hand hygiene after covering their mouths when coughing. Circumstances where students cover their nose when sneezing require the individual to wash hands immediately, if possible, to avoid being a mode of spread of infection. Students are advised to stay home when ill. Instances and certain situations also tend to be barriers and or levers to the maintaining or performance of proper and effective hand hygiene. These barriers or levers include environmental factors, social/cultural factors, knowledge or skills of students, aftermath consequences, student's study profession, individual motivation towards hand hygiene, student's attitude, and memory lapses. These levers or barriers also have an effect on respiratory hygiene in situations where students are ill with a cough or flu. The fundamentals of respiratory hygiene comprise protecting or covering ones mouth or nose by the use of a tissue paper or handkerchief when coughing or sneezing. Also the bending of the elbow into a crook could be improvised to hold back respiratory droplets from contaminating surrounding surfaces. (DHS 2016).

Furthermore, tissue papers used in holding respiratory droplets or secretions must be discarded into any close by waste bin immediately after use. It is important to also maintain hand hygiene by washing hands with non-antimicrobial soap and water, using alcohol hand rub, or performing an antiseptic hand wash as soon as hands come in contact with items or surfaces contaminated with respiratory droplets or secretions. Surfaces visible with respiratory secretions should be cleaned with tissue. Alcohol based disinfectants should then be used in cleaning the surfaces after it has been wiped with the tissue. (DHS 2016).

There has to be more information and education on the modes and ways microbes are spread and how effective proper washing of hands is in preventing the spread of infections like flu, cold, noro-virus, hepatitis A, viral meningitis and others. Students need to be informed on the minimal time required for alcohol-based hand rub to kill most germs on the hands after use. This information would aid students in the proper application of alcohol based hand rub. Applying and maintaining alcohol hand rub on hands for at least 20 seconds after application is necessary to fully kill any existing germs and transferred infection. Students also need to be informed on the importance of washing and drying between the fingers when washing hands since it is essential for getting rid of moist areas where microbes can hide. Using the same paper for drying of hands after washing to close the tap should be one of the information stressed on for students in the prevention of spread of microbes. Infections or bacteria that cause illness could be spread through several means and ways. There are 5 common ways in which bacteria that cause infection can be spread. Infections can be spread through intestinal action or through faeces. This is common in cases such as a student having diarrhea or Hepatitis A. The second most common is by the respiratory tract. This is usually accompanied with lungs, nose, eyes, and mouth secretion most commonly in disease cases such as common cold or influenza. The third common way is through direct or indirect contact. This occurs in a situation where there is skin contact, coming in contact with infected body fluids, or through sexual contact. This is most common in instances where the infected individual is suffering from bacterial skin infections like scabies, or impetigo. Indirect contact involves the contracting of infection by means of coming in contact which inanimate object infected with the bacteria. These inanimate objects may include pencils, handkerchiefs, cutleries, door knobs, tables, chairs and other surfaces that have been contaminated by infections such as the influenza virus and the common cold. The forth way of being infected is by coming in contact with contaminated blood with illness such as HIV AIDS, Hepatitis B, and Hepatitis C. The fifth is by eating or swallowing contaminated food or water in cases of food poisoning. (PHMCDG 2014).

Hand washing may seem to be an easy task but certain measures are essential to follow in order to decrease the amount of microbes on hands in preventing infection. The steps necessary to be followed includes first to take away any rings or bracelets from the wrist or fingers and wet the hands with water. Then soap is added and all folds and surfaces of the hands including the back of the hand nails must be lathered and cleaned with the soap for not less than 15 seconds. The hands are then rinsed under flowing water in a rubbing movement. Once all visible foam or slippery soapy feeling on the hands is off, dry hands gently to prevent breaking the skin with paper towel or any clean towel. The tap is then turned off using the paper towel to prevent recontamination of your fingers after wash. In cases where public restrooms are used the paper towel can be used to open the door on your way out after washing hands. (Health Canada 2009).

Further studies can be done on researching on which group of students in the university require more education and knowledge on these hand hygiene facts in respect to study courses. This could help narrow down and bring more light on which campus, department or bachelor degree students require further education and motivation in maintaining hand hygiene.

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APPENDICES

RESEARCH PERMISSION

TUTKIMUSLUPA-ANOMUS

Organisaatio, jolle anomus osoitetaan	CENTRIA UNIVERSITY OF APPLIED SCIENCES
Vastuuhenkilö organisaatiossa	MARKO FORSELL
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Tutkimuksen nimi KNOWLEDGE AND ATTITUDE OF STUDENTS IN CENTRIA UAS TOWARDS EFFECTIVE HAND HYGEINE; Reduction and prevention of infection in the University Campus.

Tutkimuksen tarkoitus the purpose is to find out the knowledge of hand hygiene amongst the students, their attitudes towards hand hygiene, and how to persuade students to adhere to such practices.

Tutkimuksen kohderyhmä First, second and final year students in the UAS.

Ainesiston keruun arvioitu ajankohta A period of 1 week. Maximum 2 weeks.

Tutkimusmenetelmä A Quantitative research method.

Tutkimussuunnitelmä hyväksyyty 25/11/2015

Tutkimuksen ohjaaja Timo Kinnunen

Lupa myonnetaan paika Centria Ammattikorkea koulu/ Kokkola aika: 25/11/2015

☑ *anomuksen mukaisesti* ☐ *muutosehdotuksin* ☐ *hylätty*

Luvanmyöntäjän allekirjoitus _____

LITTEET

☑ *Tutkimussuunnitelma*

☐ *Kysely/ haastattelulomake*

☐ *Muut liitteet, mitkä* ____*Questionnaire*____

QUESTIONNAIRE

KNOWLEDGE AND ATTITUDE OF STUDENTS TOWARDS EFFECTIVE HAND HYGIENE.

Answers to this questionnaire will be made anonymous and any personal information would NOT be used or duplicated for any purposes. All answered questionnaires would be erased after compilation of necessary data.

GENERAL CHARACTERISTICS OF THE STUDY GROUP- DEMOGRAPHIC DATA

Age:

Gender:

Nationality:

Year of study:

Degree Program:

GENERAL KNOWLEDGE ON HAND HYGIENE

INSTRUCTIONS: In this section, questions are based on acquiring the respondent's knowledge and personal understanding on hand hygiene. **Please indicate your response by choosing in the appropriate alternative; A = strongly Agree, B = agree, C = Neutral, D = Disagree and E =strongly Disagree**

1. The use of hand disinfectant is better than hand washing with soap.
   A. Strongly agree
   B. Agree
   C. Neutral
   D. Disagree
   E. Strongly disagree

2. Microbes on door, toilet, and bathroom tap handles cannot cause illness.
   A. Strongly agree
   B. Agree
   C. Neutral
   D. Disagree
   E. Strongly disagree

3. Proper hand hygiene prevents severe infections like cold, noro-virus, Hepatitis A and viral meningitis.
    A. Strongly agree
    B. Agree
    C. Neutral
    D. Disagree
    E. Strongly disagree

4. What is the minimal time needed for alcohol-based hand rub to kill most germs on your hands? (tick one answer only)

    A. 20seconds
    B. 3seconds
    C. 1minute
    D. 10seconds
    E. 5 seconds

INDIVIDUAL KNOWLEDGE PRACTICES ON HAND HYGIENE

INSTRUCTION: In this section, questions should be answered according to personal habits and characteristics. Please indicate your response by choosing the appropriate alternative or write where necessary to a given space. When given multiple choices, choose the best fitting one only.

5. It is essential to wash my hands prior to eating or dinning.
    A. Yes
    B. No
    C. Sometimes
    D. Rarely

6. Washing hands after dinning or eating is very important for me.
    A. Yes
    B. No
    C. Sometimes
    D. Rarely

7. Do you wash hands after you have been in the rest room?
    A. Yes
    B. No
    C. Sometimes
    D. Rarely

8. Do you cover your mouth when coughing?
    A. Yes
    B. No
    C. Sometimes
    D. Rarely

9. Do you cover your nose when you have to sneeze?
    A. Yes
    B. No
    C. Sometimes
    D. Rarely

10. Do you wash your hands after coughing?
    A. Yes
    B. No
    C. Sometimes
    D. Rarely

11. Do you stay at home when you have a flu or diarrhea?
    A. Yes
    B. No
    C. Sometimes
    D. Rarely

12. Do you always wash your hands with soap before eating?
    A. Yes
    B. No
    C. Sometimes
    D. Rarely

13. I dry between my fingers and palms when washing my hands?
    A. Yes
    B. No
    C. No idea

14. I use the same paper for drying my hands to close the tap?
    A. Yes
    B. No
    C. No idea

15. I feel concerned to inform school colleagues to perform hand hygiene when they fail to do so in most circumstances.
    A. Yes
    B. No

16. I feel positive about doing proper hand hygiene.
    A. Yes
    B. No

17. Hand washing is a habit for me
    A. Strongly Agree
    B. Agree
    C. Neutral
    D. Disagree
    E. Strongly Disagree

18. Sometimes I miss out hand hygiene simply because I forget it
    A. Strongly Agree
    B. Agree
    C. Neutral
    D. Disagree
    E. Strongly Disagree

19. How many minutes/ seconds do you use in washing your hands after using the bathroom?
    A. 1 – 5 seconds
    B. 6 – 10 seconds
    C. 11 – 30 seconds
    D. 30 – 60 seconds
    E. 1- 3 minutes

20. How often do you wash your hands during a school day?
    A. Once
    B. Twice
    C. More than 5 times
    D. More than 10 times
    E. I do not wash my hands during a school day

21. After hand washing I always turn the bathroom tap off with
    A. Paper
    B. Wet Clean hands
    C. Dry clean hands

22. How often do you get affected by the following illness? Fever, diarrhea, flu, cough, Sneeze, or sore throat.
    A. Frequently
    B. Once or twice a month
    C. Once every 3 months
    D. Once every 6 months
    E. Rarely

METHODS TO IMPROVE KNOWLEDGE AND APPLICATION OF HAND HYGIENE

INSTRUCTIONS: Please indicate your response by choosing the appropriate alternative or write where necessary to a given space. When given multiple choices, choose the best fitting one only

23. Does the school organize seminars or educate proper hand cleaning techniques occasionally?
    A. Yes
    B. No

24. Where do you learn or obtain current information about general hygiene?
    A. Home
    B. School
    C. Medical facility
    D. Friends
    E. State, if other .....

25. There is always the availability of hand-sanitizers and soap at the designated places in the school.
    A. Yes
    B. No
    C. Seldom
    D. Not aware

26. After hand washing I always turn the bathroom tap off with
    A. Paper
    B. Wet clean hands
    C. Dry clean hands

27. How often do you get affected by the following illnesses: Fever diarrhea, flu, cough, sneeze, or sore throat?
    A. Frequently
    B. Once or twice a month
    C. Once every 3 months
    D. Once every 6 months
    E. Rarely

28. Does the school organize seminars or educate proper hand cleaning techniques occasionally?
    A. Yes
    B. No

29. Where do you learn or obtain current information about general hygiene?
    A. Home
    B. School
    C. Medical facility
    D. Friends
    E. Other, state here _____

30. There is always the availability of hand-sanitizers and soap at the designated places in the school.
    A. Yes
    B. No
    C. Seldom
    D. Not aware