RESEARCH ARTICLE

Hand Hygiene Knowledge, Practices, and Skills of Personnel and Students in a Private Higher Education Institution

Jenny F. David, MAN, RN[1]

Abstract

With the communicable diseases headlining several media platforms, hand washing remains the most effective way to remove germs and help prevent the spread of microorganisms -- when done correctly. Proper hand hygiene plays an essential role in reducing the occurrence of transmitting microbes. This descriptive quantitative research study primarily aims to assess the knowledge, practices, and skills of a Private Higher Educational Institution university personnel and students towards Proper Hand Washing. Data was obtained using Google Forms from 316 participants of Holy Angel University personnel and students aged 18 years old and above. The majority, or 54%, of participants had a high level of hand hygiene knowledge, good hand hygiene practices (52%), and proficient hand hygiene skills (72%). Overall, the university personnel and students demonstrated good knowledge and skills, and practices towards hand hygiene. Results can inform programs and policies to improve handwashing as a protective measure against viral infections.

Keywords: *Hand hygiene, knowledge, practices, skills, COVID-19, HEI, students, faculty, non-teaching personnel*

Introduction

Coronavirus disease 2019 (COVID-19), also known as Severe Acute Respiratory Syndrome Coronavirus 2, is defined as an illness caused by the novel coronavirus. COVID-19 is a respiratory infection first discovered in Wuhan City, Hubei Province, China, in December 2019. Fever, dry cough, fatigue, muscle pain, shortness of breath, and difficulty breathing are identified as its main symptoms. This disease has rapidly spread from Wuhan city in China to other parts of the world, threatening many people's lives. By the end of January 2020, the World Health Organization (WHO) announced a public health emergency of international concern, calling the attention of all countries to collaborative efforts in preventing its rapid spread across the globe (Al-Hanawi, 2020).

In addition to COVID-19, communicable diseases transmitted by hand remain a significant concern. Proper handwashing practices effectively prevent these diseases' transmission, reducing illness rates. It is stated in a study from the United Kingdom that nosocomial infections affect 10% of patients, which causes 5,000 deaths in a year. This could decrease by 15% if hand hygiene recommendations were made accordingly (Ergin, 2011). During the period of H1N1 Influenza, it was reported in a study done at a university in Korea that there was an increase in the participants' handwashing behavior to prevent the increase of infection. The study showed that most subjects reported an increase in the frequency of hand washing to prevent infection during this period. Similar findings were reported in the study from the United Kingdom, with 28% of the participants reporting changing their behavior in hand washing because of the H1N1 influenza pandemic. Preventative measures such as hand washing have become more common during pandemics (Park et al., 2010).

Hand washing is considered one of the most effective hygiene promotions in public health in developing countries and the most successful prevention of the spread of infectious

[1] Holy Angel University, School of Nursing and Allied Medical Sciences; Email: jfdavid@hau.edu.ph

diseases. By proper hand washing, the spread of infection could be lessened, and illness rates can be decreased, breaking the chain of infection (Dickie et al., 2017). Although it is accepted universally as crucial in preventing diseases, there are still minimal chances of children doing proper handwashing, and students need more knowledge of it (Dajaan et al., 2018).

Poor hand hygiene increases the risk of community-acquired infections that have a terrible effect on a person's health which can be noticed in personal, social, and economic areas (Novák et al., 2019). Doing appropriate hand hygiene practices slows down the spread of infectious diseases that cause lost school days and workdays because of absences. Promoting good hygiene practices to reduce illness-related absences is well-known prevention of many infectious diseases. Student education is essential in limiting the spread of infectious diseases in universities because it is an essential function for infection control, like the healthcare setting (Mbroh, 2019).

A private higher education community has many stakeholders, students, employees, the administration, and management. The university community also includes other organizations such as university researchers, alumni, scholarship and grants, and other businesses (Jongbloed et al., 2008). Despite the importance of hand hygiene, there still needs to be a research gap concerning the knowledge, practices, and skills related to hand hygiene compliance among personnel and students in private higher education institutions. While existing studies have emphasized the significance of handwashing, there needs to be a more detailed exploration of how this research will contribute to our current understanding of hand hygiene compliance. By addressing this gap, we can better identify areas for improvement and develop targeted health education programs to enhance hand hygiene.

This study primarily aims to assess university personnel and students' knowledge, practices, and skills toward Proper Hand Washing. Specifically, it describes the participants' demographics, baseline handwashing behavior, knowledge, skills, and practices.

Methods

Research Design

The study utilized a cross-sectional descriptive research design to assess the level of knowledge, skills, and practices of university personnel and students towards proper hand washing was conducted from June to September 2020.

Sample and Setting

The open-access web-based epidemiologic statistics package (OpenEpi.com, version 3.01) yielded a total of two hundred sixty-three (263) members of a private higher educational institution, after factoring in an estimated population of 9289, hypothesizing a 50% chance of the outcome variables being noted at 90% confidence interval (Dean, Sullivan & Soe, 2013). The participants were individuals enrolled in and working for a private higher educational institution in Angeles City. The following were the Inclusion Criteria: (1.) they were enrolled students in the university, 18 years old and above or (1. b) an employee (teaching or non-teaching), and (2) understood a conversational level of English.

Instrument

An instrument from the Evaluation of Students' Social Hand Washing Knowledge, Practices, and Skills in a University Setting (Ergin et al., 2011) was adopted. A separate study reported that Cronbach's alpha ranged from 0.74 to 0.95 across the scales (Birgili et al., 2019). The questionnaire was fitted into an open-web-based survey platform (Google Forms) that facilitated online access and completion of the questionnaire, quickly and efficiently collecting data. The socio-demographic profile of the participants (age, gender, school unit or department, residence, and socioeconomic status) were collected to attain descriptive statistics that provided context to the setting.

In the first section, the participants were questioned about handwashing behavior. It consisted of two questions. The first question (*How many times a day do you wash your hands?*) was answerable to: "never," "1-2 times", "3-5 times", "6-10 times", and "11 and over". The second question (*Main reason for skipping hand washing*?) was answerable with the statements: "no need," "far from the sink," "keep forgetting," "side effects," and "others."

In the next section, the participants were asked about their knowledge, practice, and skills in hand hygiene. The Hand Hygiene Knowledge Assessment measured the participant's knowledge of handwashing; the participants were given eight questions that were answerable by: "agree," "disagree," and "do not know ."Prompts included: "Medium hot water should be used for handwashing," "No need to wash wrists," and "Need drying after washing the hands."

The Hand Hygiene Practices Assessment assessed the handwashing practices of the participants; 21 questions were answerable by: "Always," "Sometimes," and "Never." Examples of these relevant practices are: "I wash my hands before meals," "I wash my hands after using the restroom.", and "I wash my hands after touching animals." A participant is described as *good* in handwashing practices if they reported "Always" to 16-21 items, *moderate* if they reported "Always" to 9-15 items, and *poor* if they reported 1-8 items in this section.

The Skills Assessment for the last section assessed the handwashing skills of the participants. It consisted of 10 questions that were also answerable by: "Always," "Sometimes," and "Never." A sample of the skills assessed was: "Folding sleeves and removing jewelry such as watches and rings," "Making soap lather with some water," and "Drying hands." A participant is described to be *proficient* in handwashing skills if they reported "Always" to 8-10 items, *needs development* if they reported "Always" to 5-7 items, and *poor* if they reported 1-4 items in this section.

Correct responses for social handwashing knowledge questions were 'disagree' responses for the 1st, 3rd, 4th, and sixth propositions and 'agree' responses for the 2nd, 5th, seventh, and eighth propositions. Correct responses for social handwashing practice questions were 'never' responses for the 3rd, 6th, and 11th, and 'always' responses for the rest of the questions. In evaluating the social hand washing skill score, only the 'always' response received 1 point for all questions. A participant is described as having a *high* level of handwashing knowledge if they scored 7-8 points, *moderate* if they scored 4-6 items, and *low* if they reported 1-3 items in this section.

Eight questions were used to evaluate handwashing knowledge, 21 assessed the handwashing practice, and ten assessed their handwashing skills. A score of $\geqslant$ 75% was considered good practice, proficient in skill, and a high level of knowledge. Those who failed to answer correctly at least 50% of the asked responses were categorized as having poor practices, skills, and low levels of knowledge (Maqbool et al., 2021).

Data Collection and Procedure

The researcher published an invitation to participate in the study through multiple social media platforms to reach private university personnel and students. The participant's information sheet and an electronic informed consent mechanism were included in the invitation. After achieving the goal of three hundred sixteen participants, the data were downloaded into a spreadsheet.

The study obtained approval from the Human Resource Management Office and The Office of the President for the data collection process of disseminating the survey questionnaires to participants. A cover letter about the study and a consent form was attached to the instruction for completing the survey. The data were collected electronically using the web-based software "Google Forms." The Google forms were disseminated via electronic communication (thru email and other web-based platforms). Survey answers were sent to a link at Google Drive, where data was stored in a password-protected cloud, after which they shall be deleted. The Data will be stored for two years from the date of termination of involvement or at such time the participant submits electronic cancellation of his consent as per the Data Privacy Act of 2012.

Data Analysis Procedure

Using IBM SPSS software, descriptive statistics were utilized to analyze data. Frequency, measures of central tendency, and percentage were computed to describe the socio-demographic characteristics of the participants and their knowledge, practices, and skills regarding hand washing.

Ethical Consideration

The Institutional Review Board has ethically reviewed and approved the study with protocol number 2020-038-JFDAVID-HANDHYGIENE. The research was conducted with quality ethical and professional behaviors. The study guaranteed and safeguarded the individual informant's autonomy through the distribution of the survey, which was handled and answered by the participants with full consent, to guarantee the confidentiality of any private and or personal information of the participants that may compromise the participants. The study participants were not provided with any direct compensation. There was no manipulation on the part of the participant. Thus, participation was optional, and they had the right to withdraw at any study stage. Misleading information or any exaggeration or deception was not tolerated or used while conducting the research. Participants could quickly answer the survey questions, for the study had no perceived risks. After completion of the survey, the information's storage will be secured in the researcher's device for up to two years, after which the data will be deleted.

A total of 316 individuals from the university participated in this study. Table 1 outlines the profile of the participants. The samples were predominantly female (67.7%). The majority of the participants were students (n=189; 59.8%), faculty members (27.2%), and non-teaching personnel (13%). Under the departments, The School of Nursing and Allied Medical Sciences had the highest number of participants among the schools (35.8%). The distribution under the living location shows that most participants live with their families (95.3%). Distribution of the family by socioeconomic status shows that (6.3%) fall in low, (92.7%) in the middle, and (1%) in the high social and financial status category among the schools (35.8%). Distribution of the family by socioeconomic status shows that (6.3%) falls in the low, (92.7%) in the middle, and (1%) in the high social and financial status category

Table 1. *Demographic Data (n=316)*

Sex	***f***	**%**
Female	214	67.7
Male	102	32.3
Classification	***f***	**%**
Student	189	59.8
Faculty	86	27.2
Non-Teaching Personnel	41	13
Department	***f***	**%**
School of Nursing and Allied Medical Sciences	113	35.8
School of Hospitality and Tourism Management	41	13
School of Arts and Sciences	24	7.6
Basic Education Department	21	6.6
School of Engineering and Architecture	20	6.3
School of Business and Accountancy	18	5.7
School of Computing	16	5.1
College of Criminal Justice Education and Forensics	16	5.1
School of Education	8	2.5
University Library	5	1.6
Institute for Christian Formation and Social Integration	5	1.6
High School Library	4	1.3
University Guidance	3	1
Graduate School	3	1
Others	20	6.3
Socio-economic Status	***f***	**%**
Low	20	6.3
Middle	293	92.7
High	3	0.9

Note: ***n*** *= 316* ***f****=frequency* ***%****=percentage*

Table 2. *Handwashing Behavior (n=316)*

Questions	**Answers**	**n (%)**
How many times a day do you wash your hands?	1-2 times	10 (3.2)
	3-5 times	93 (29.4)
	6-10 times	141(44.6)
	11 and over	72 (22.8)
The main reason for skipping hand washing	Far from the sink	55 (17.4)
	No need	85 (26.9)
	Side effects	8(2.53)
	Keep forgetting	117 (37)
	Others	51 (16.1)

Table 2 details the university participant's handwashing behavior. Regarding the question "How many times do you wash your hand" less than half of the total participants (44.6%) wash their hands 6 to 10 times a day, much higher (29.4%) than those who reported washing their hands 3-5 times in a day, and those participants (3.2%) who washes their hands to only 1-2 times a day.

Less than half of the participants think that the main reason for skipping hand washing is that they "keep on forgetting" (37%), much higher than those individuals who think there is "no need" (26.9%), "far from sink"(17.4%) responses..

Table 3 shows the University participants' knowledge level of hand washing. More than half (54%) demonstrated a high level of handwashing knowledge (7 to 8 correct answers), followed by 43% of the participants demonstrating a moderate level of handwashing knowledge (4 to 6 correct answers), and only seven (2%) demonstrated a low level of knowledge (1 to 3 correct answers). Overall, the mean score of the sample's handwashing knowledge was moderate ($\bar{x}$=6.47, SD=1.30).

Table 4 shows the practice level of the participants in which hand washing was categorized as good, moderate, and poor practice. Good practice (52%) correctly answered the questions from numbers 16 to 21. Moderate practice (45%) answered correctly on questions number 9 to 15, while poor practice (3%) was able to answer only 1-8 correct answers out of 21 questions. The level of handwashing practice of the participants demonstrated a good level since almost half of the total number of participants performed hand hygiene practices regularly.

Overall, the mean score of participants' handwashing practice was moderate to good ($\bar{x}$=15.09, SD=2.66).

Table 5 shows that most of the University participant's skill level in handwashing was proficient (72%), which obtained 8 to 10 correct answers. The needs development of skill (22%) were able to supplement 5 to 7 correct answers, while the remaining (7%) had poor skill, answering correctly to only 1 to 4 questions.

Overall, the mean score of participants' handwashing skills was proficient ($\bar{x}$=8.16, SD=1.98).

Discussion

A study assessed the knowledge, skills, and practices related to hand hygiene among personnel and students in a private university from June to September 2020. The study included participants from all levels of the university, and necessary permissions and consent were obtained.

The study evaluated the participants' knowledge, practices, and skills regarding proper handwashing. The frequency of handwashing was an important aspect examined, with 44.6% of participants reporting a moderate frequency of handwashing (six to ten times a day). This frequency has been associated with a lower risk of infection. Additionally, 22.8% of participants washed their hands 11 times or more daily, indicating a high frequency. These participants demonstrated an awareness of the importance of frequent

Table 3. *Level of knowledge on handwashing (n=316)*

	n (%)
High (7 to 8 correct answers)	172 (54)
Moderate (4 to 6 correct answers)	137 (43)
Low (1 to 3 correct answers)	7 (2)
Mean ($\bar{x}$)	6.47
Standard Deviation (SD)	1.30

Table 4. *Levels of practice on handwashing (n=316)*

	n (%)
Good (answered *always* in 16 to 21 items)	166 (52)
Moderate (answered *always* in 9 to 15 items)	145 (45)
Poor (answered *always* in 1 to 8 items)	8 (3)
Mean ($\bar{x}$)	15.09
Standard Deviation (SD)	2.66

Table 5. *Levels of skill in handwashing (n=316)*

	n (%)
Proficient (answered *always* in 8 to 10 items)	227 (72)
Needs development (always answered in 5 to 7 items)	68 (22)
Poor (answered *always* in 1 to 4 items)	21 (7)
Mean ($\bar{x}$)	8.16
Standard Deviation (SD)	1.98

handwashing in reducing the spread of microorganisms, particularly during the pandemic. However, 3.2% of participants reported washing their hands only 3-5 times daily, suggesting a need for targeted hand hygiene promotion at the individual level.

Regarding reasons for skipping handwashing, the most common responses were the distance to the sink being too far (55%) and forgetting to wash hands (37%). These findings highlight the need for comprehensive public health education programs to improve handwashing compliance. Previous studies have also emphasized addressing gaps and deficits in hand hygiene behavior (Ergin et al., 2011; Mbroh, 2019).

The overall knowledge of hand hygiene among participants ranged from 50% to 75%, indicating moderate results. More than half of the participants demonstrated good knowledge of basic hand hygiene, which may be attributed to formal learning during primary school and informal learning from sources such as television and social media advertisements. However, many participants had low (2%) or moderate (43%) levels of hand hygiene knowledge. Deficits were observed in understanding the water temperature for handwashing, emphasizing the need for clear and straightforward communication about hand hygiene. Addressing these knowledge gaps is crucial for improving hand hygiene practices (Maqbool et al., 2021; Pratinidhi et al., 2020).

Regarding handwashing skills and practices, most faculty, non-teaching personnel, and students demonstrated good proficiency, scoring above 75%. They reported practicing handwashing after touching garbage, preparing meals, and using the restroom most frequently. However, handwashing before using the restroom, when soiled, and after handshaking were less commonly practiced. These findings align with previous studies among college-level students but differ from the practices reported by mothers of children. It suggests that participants associate hand hygiene primarily with physical cleanliness and may be unaware of the ubiquity of disease-causing microorganisms. The Centers for Disease Control and Prevention recommend handwashing in various situations to prevent the spread of infections (Centers for Disease Control and Prevention, 2018).

Research has shown variations in handwashing knowledge, skills, and practices across different populations, including students. Studies conducted in developing countries have highlighted knowledge gaps and the need for interventions to promote proper hand hygiene practices. Targeted education and intervention programs have been recommended to address deficiencies in handwashing knowledge, attitudes, and practices among school students (Almoslem et al., 2021; Hao et al., 2022). This study was conducted during the COVID-19 Pandemic; several limitations were present. Data collection was done online, making it difficult for the researcher to gather data, mainly because the participants could not be met personally. The study design was cross-sectional; therefore, participants were selected due to the specific criteria and interests of the researcher. Due to this data-gathering strategy, some participants may not have met these requirements, but the researcher would not know since all the participants were anonymous, following data privacy. Since the scope of the study is about the knowledge, skills, and practices in hand hygiene, the responses may have been answers that were socially accepted or what is expected (Mortel et al., 2008).

The study could be conducted among different populations aside from higher education institutions because the topic is significant, especially during the pandemic, since hand hygiene is the most critical intervention in preventing disease transmission. Observational studies of handwashing techniques could better assess skills and practices. It is recommended that a similar study will be conducted on a different population group, such as public higher education institutions and other institutions.

This study can help identify the gaps in knowledge, poor practices, and skills regarding hand hygiene among university students, faculty, and non-teaching personnel. It will also serve as a guide in planning, implementing, and promoting essential hand hygiene aspects. It answers the how, when, and where to practice hand hygiene, especially during this pandemic. It is necessary to address the deficits and gaps in knowledge, poor practice, and low-level skills of participants to recommend strategies appropriately to increase hand hygiene awareness in the university, most notably during the COVID-19 Pandemic. The results of this study could also be used to institute health education programs to correct or augment the level of knowledge, skills, and practices of higher education institution communities. The study results could also guide their policies to facilitate correct and consistent hand hygiene practices in their institution.

Conclusion

The study assessed the level of knowledge, practices, and skills of the students, faculty, and non-teaching personnel. The study's findings showed an acceptable level of knowledge, practices, and skills in hand hygiene. However, it is essential to help the university personnel and students identify the knowledge, gaps, and deficits, and its poor practices. Interventions to raise awareness, improve compliance, and model good hand hygiene practices are crucial to achieving healthy university personnel and students.

References

Al-Hanawi, M., Angawi, K., Alshareef, N., Qattan, A., Helmy, H., Abudawood, Y., Alqurashi, M., Kattan, W., Kadesah, N., Chirwa, G., Alsharqi, O. (2020). Knowledge, Attitude, and Practice Toward COVID-19 Among the Public in the Kingdom of Saudi Arabia: A Cross-Sectional Study. *Frontier Public Health, 8: 217.* DOI: 10.3389/fpubh.2020.00217

Almoslem, M. M., Alshehri, T. A., Althumairi, A. A., Aljassim, M. T., Hassan, M. E., & Berekaa, M. M. (2021). Handwashing Knowledge, Attitudes, and Practices among Students in Eastern Province Schools, Saudi Arabia. *Journal of environmental and public health*, *2021*, 6638443. https://doi.org/10.1155/2021/6638443

Bimerew, M., & Muhawenimana, F. (2022). Knowledge, attitudes, and practices of nurses towards hand washing in infection prevention and control at a psychiatric hospital. *International Journal of Africa Nursing Sciences*, *16*, 100399. https://doi.org/10.1016/j.ijans.2022.100399

Birgili, F., Baybuga, M., Ozkoc, H., Kuru, O., van de Mortel, T., Tümer, A. (2019). Validation of a Turkish translation of The Hand Hygiene Questionnaire. *Eastern Mediterranean Health Journal. 25 (5), p299-305.*

Boshell, P. (2017, September 5). The Importance of Hand Hygiene at Home and School. https://info.debgroup.com/blog/hand-hygiene-at-home-and-school.

Centers for Disease Control and Prevention. (2017). Handwashing: Clean hands save lives. https://www.cdc.gov/handwashing/why-handwashing.html.

Dajaan, D., Addo, H., Ojo, L., Amegah, K., Loveland, F., Bechala, B., Benjamin, B. (2018). Hand washing knowledge and practices among public primary schools
in the Kintampo Municipality of Ghana. *International Journal of Community Medicine and Public Health,5, 6.* DOI: http://dx.doi.org/10.18203/2394-6040.ijcmph20182146.

Dean, A.G., Sullivan, K.M., Soe, M.M. (2013). *OpenEpi:* Open Source Epidemiologic Statistics for Public Health, Version. *OpenEpi*. https:// www.OpenEpi.com, updated 2013/04/06.

Dickie, R., Rasmussen, S., Cain, R., Williams, L., & MacKay, W. (2017). *The effects of perceived social norms on handwashing behavior in students.* https://www.tandfonline.com/doi/full/10.1080/13548506.2017.1338736?scroll=top&needAccess=trueaa.

Ergin A., Bostanci, M., Onal, O., Bozkurt, A., Ergin, N. (2011). Evaluation of Students' Social Hand Washing Knowledge, Practices, and Skills in a University Setting. *Cent Eur J Public Health. 19 (4): 222–227*. DOI: 10.21101/cejph.a3664.

Hao, M., He, J., Zeng, Y., Han, W., Sai, A., & Yamauchi, T. (2022). A comprehensive assessment of hand washing: knowledge, attitudes and practices (KAP) and hand-washing behaviors among primary school students in northeast China. *Sanitation Value Chain*, *6*(1), 13-22. https://doi.org/10.34416/svc.00026

Hillier, M. (2020). Using effective hand hygiene practices to prevent and control infection. Nursing Standard. DOI: 10.7748/ns.2020.e11552.

Jongbloed, B., Enders, J. & Salerno, C. (2008). Higher education and its communities: Interconnections, interdependencies, and a research agenda. High Educ 56, 303–324. https://doi.org/10.1007/s10734-008-9128-2.

Keerthana, K., Laxmish, M., Kundabala, M., & Ramya, S. (2017). Evaluation of Student's Hand Washing Knowledge, Practices and Skills in a College Setting. *Indian Journal of Public Health Research & Development*, *8*(1), 115-119. https://doi.org/*10.5958/0976-5506.2017.00023.7*

Kassema, J. J. (2020). COVID-19 outbreak: is it a health crisis or economic crisis, or both? Case of African Counties. *SSRN Electr J. 9:4–14*. https:/doi.org/10.2139/ssrn.3559200

Jemal S. (2018). Knowledge and Practices of Hand Washing among Health Professionals in Dubti Referral Hospital, Dubti, Afar, Northeast Ethiopia. *Advances in preventive medicine*, *2018*, 5290797. https://doi.org/10.1155/2018/5290797

Lindzon, J. (2020). *"School closures are starting, and they'll have far-reaching economic impacts."* Fast Company. https://www.fastcompany.com/90476445/school-closures-are-starting-and-theyll-have-far-reaching-economic-impacts

Mbroh, L. (2019). Assessing Knowledge, Attitude, and Practices of Hand Hygiene among University Students. *Minnesota State University, Mankato.* https://cornerstone.lib.mnsu.edu/cgi/viewcontent.cgi?article=1948&context=etds.

McKibbin, W.J., Fernando, R. (2020). The global macroeconomic impacts of COVID-19: seven scenarios. *SSRN Electr J.20–24.* https://doi.org/10.2139/ssrn.3547729

Mohamed, N., Amin, N., Ramli, S., Isahak, I., Salleh, N. (2016). Knowledge, attitudes, and practices of hand hygiene among parents of preschool children. *Journal of Scientific and Innovative Research. 5(1).* http://ddms.usim.edu.my:80/jspui/handle/123456789/12083.

Maqbool, S., Haider, M., Iqbal, A., Ihtesham, A., Mohamed, W. I., Langove, M. N., ... & Omer, H. (2021). Assessment of knowledge, attitude, handwashing practices and its associated factors among mothers of children presenting in the pediatric department of a tertiary care hospital of a developing country. *Int J Human Health Sci*, *5*, 418-423. http://dx.doi.org/10.31344/ijhhs.v5i4.351

Mortel, V.D., & Thea, F. (2008). Faking it: Social desirability response bias in self-report research. *Australian Journal of Advanced Nursing, 25, 40-48. Research Gate.* https://www.researchgate.net/publication/47282357_Faking_it_Social_desirability_response_bias_in_self-report_research

Novák, M., Breznický, J., Kompaníková, J., Malinovská, N., & Hudečková, H. (2019). Impact of hand hygiene knowledge on the hand hygiene compliance. http://ljkzedo.ba/mgpdf/mg32/11_Novak_1051_A.pdf.

Nuwagabaa, J., Ashoka, D., Balizzakiwaa, T., Kisengulaa, I., Nagaddyaa, E., Rutayisirea, M. (2020). The Era of Coronavirus; Knowledge, Attitude, Practices, and Barriers to

Hand Hygiene Among Makerere University Students and Katanga Community Residents. https://doi.org/10.1101/2020.06.05.20123042.

Pan, S. C., Sheng, W. H., Tien, K. L., Chien, K. T., Chen, Y. C., & Chang, S. C. (2016). Promoting a Hand Hygiene Program Using Social Media: An Observational Study. *JMIR public health and surveillance, 2(1), e5.* https://doi.org/10.1101/2020.06.05.20123042.

Park, J.,Cheong, H., Son, D., Kim, S. & Ha, C. (2010). Perceptions and behaviors related to hand hygiene for the prevention of H1N1 influenza transmission among Korean university students during the peak pandemic period. *National Library of Medicine.* https://doi.org/10.1186/1471-2334-10-222.

Pratinidhi, Haribhakta, Ambike, Bhole & Kankariya (2020). Study of knowledge and practices related to handwashing in school-going children of a rural community. *International Journal of Contemporary Pediatrics.* http://dx.doi.org/10.18203/2349-3291.ijcp20195569.

Shilunga, A., Amukugo, H., Mitonga, K. (2018). Knowledge, attitudes, and practices of primary school learners on sanitation and hygiene practices. *International Journal of Community Medicine and Public Health, 5(8):3197-3204.* DOI: http://dx.doi.org/10.18203/2394-6040.ijcmph20183051.

Shrestha, M., Manandhar, N., Joshi, S. (2018). Study on Knowledge and Practices of Water, Sanitation, and Hygiene among Secondary School Students*. Journal of College of Medical Sciences-Nepal, 3(14)*. DOI: 10.3126/jcmsn.v14i3.21158.

Sultana, M., Alam Mahumud, R., Razzaque Sarker, A., & Mahmud Hossain, S. (2016). Hand hygiene knowledge and practice among university students: evidence from Private Universities of Bangladesh. Risk Management and Healthcare Policy, 13. DOI:10.2147/hp.s9831.

Teumta, G., Niba, L., Ncheuveu, T., Ghumbemsitia M., Itor, P., Chongwain, P. & Navti, L. (2019). An Institution-Based Assessment of Students' Hand Washing Behavior. *BioMed Research International.* https://doi.org/10.1155/2019/7178645.

United Nations Educational, Scientific and Cultural Organization (2020). *COVID-19 Educational Disruption and Response*. UNESCO. https://en.unesco.org/covid19/educationresponse

World Health Organization (2009). Hand Hygiene: Why, How & When. https://www.who.int/gpsc/5may/Hand_Hygiene_Why_How_and_When_Brochure.pdf

Zhang, Y., Xue, T., Liu, Z., Chen, W., & Vanrumste, B. (2021). Detecting hand washing activity among activities of daily living and classification of WHO hand washing techniques using wearable devices and machine learning algorithms. *Healthcare Technology Letters*, *8*(6), 148-158.

ABOUT THE AUTHOR

Jenny F. David, MAN, RN is a full-time faculty member of the undergraduate program of the School of Nursing and Allied Medical Sciences at Holy Angel University(HAU) and holds the position of Assistant Professor III. She has degrees in Bachelor of Science in Nursing and a Master of Arts in Nursing and is currently pursuing a Doctor of Philosophy in Nursing Education. Her research interests include assessment and evaluation of nursing competencies and development of nurse educators.

"It is not how much you do, but how much love you put in the doing."

– Mother Teresa