OPEN ACCESS
IJNHS

Assessing Sanitation Perceptions Before and During COVID-19: Implications for Community Welfare

Paolo Araune, Rodesa Shaira Cornito, John Alenton, Justin Alvear, Sire Baldo, Angela Marie Balhon, Alfonso Matthew Baluran, Chloe Miguelle Borje, Sunshine Balandra, Grenald Luke Aves, Freidrich Paul Bacas, Fitz Jerrold Chaves, Adela Balangue, Mae Katherine Dalen

Xavier University-Ateneo de Cagayan

Article information

Article history:
Received: March 05th, 2024
Revised: June 22th, 2024
Accepted: July 20th, 2024

Corresponding author:
Name: Paolo B. Araune
Address: 73 Corrales Ave, Cagayan de Oro, 9000 Misamis Oriental, Philippines
E-mail: paraune@xu.edu.ph

International Journal of Nursing and Health Services (IJNHS), Volume 7, Issue 4, August 20th, 2024
DOI: 10.35654/ijnhs.v7i4.790
E-ISSN: 2654-6310

Abstract

Background: Proper sanitation practices are vital for community welfare, particularly in rural areas with limited access to clean water. **Objective**: This study assessed residents' perceptions of sanitation practices before and during the COVID-19 pandemic. **Methods:** Conducted in a subdivision community in Northern Mindanao, Philippines, this descriptive quantitative study. Using simple random sampling and Cochran's formula, 289 respondents represented the population. **Results:** Significant differences existed in respondents' sanitation perceptions before and during the pandemic. Older individuals had higher perceptions before, while middle-aged individuals showed higher perceptions during the pandemic. Education influenced perceptions, with college-educated respondents having the highest before and those with elementary education showing the highest during the pandemic. Family size significantly affected perceptions before. Gender emerged as the most predictive variable for sanitation perceptions before and during the pandemic: multiple regression identified age, gender, and family size as significant predictors. **Conclusion:** A Continued health education effort is crucial for sustaining correct perceptions. Addressing gender disparities and tailoring interventions to diverse age groups are essential for promoting equitable sanitation access and fostering healthier communities. **Recommendation:** Clinical practitioners should prioritize ongoing health education efforts tailored to diverse age groups and genders to sustain correct sanitation perceptions, address gender disparities, and promote equitable access to sanitation facilities, ultimately fostering healthier communities and ensuring long-term behavioral change beyond the COVID-19 pandemic.

Keywords: sanitation, perception, covid-19, water, pandemic

Introduction

Ensuring sanitation is fundamental for enhancing community welfare, preserving dignity and safety, and promoting the prudent use of energy and water while curbing malnutrition and infection transmission (1). Basic sanitation, as defined by the Centers for Disease Control and Prevention (2), involves maintaining hygienic conditions through services like industrial and hazardous waste management, wastewater treatment, and appropriate disposal methods. This includes access to facilities for the safe disposal of human waste, underscoring the vital role of sanitation practices in overall health. Individuals residing in rural areas, where access to clean water is limited, encounter challenges in upholding adequate sanitation measures. The scarcity of clean water sources compels residents to rely on untreated water from springs and deep wells, exposing them to risks associated with harmful pathogens such as bacteria and viruses (2).

Perceptions of sanitation practices vary among individuals, contributing to the rising incidence of diseases (1). Differing levels of importance attributed to sanitation practices play a role, as seen in examples like individuals preferring to wipe their hands with paper towels rather than using soap and water. The COVID-19 pandemic has further emphasized the importance of proper sanitation to prevent the transmission of pathogenic organisms. However, misinformation during the pandemic led to resourcefulness in finding alternative ways to sanitize, such as using petrol as an alternative to alcohol (3), which needed more thorough study verification and contributed to difficulties in maintaining proper sanitation.

The research was founded upon Nola Pender's Health Promotion Model, which defines health as a "positive dynamic state" rather than mere absence of illness, striving to enhance an individual's overall well-being (4). This model underscores the complex interplay between individuals and their environment in pursuit of health and offers crucial guidance for nursing professionals, emphasizing strategies for promoting health and predicting health-promoting behaviors (5).

Central to the model are individual characteristics and experiences, behavior-specific cognitions and affect, and behavioral outcomes (4). Individual characteristics encompass personal factors that influence health behavior, such as age, gender, education, and family size—all of which were considered in this study to analyze respondents' perceptions of health-promoting sanitation practices. Behavior-specific cognitions and affect involve perceptions of perceived benefits and barriers, deemed of significant motivational importance. Finally, the model focuses on behavioral outcomes, assuming individuals are cognizant of their health behaviors, capable of modifying external factors for behavior change, and acknowledging the role of health professionals in influencing behavior (4). Evaluating respondents' perceptions aided in gauging their awareness of sanitation behaviors and their perceived significance for health promotion.

Furthermore, the study aimed to examine respondents' perceptions before and during the COVID-19 pandemic to detect notable changes, particularly regarding sanitation's role in preventing COVID-19 transmission. The emphasis was on sanitary practices such as handwashing, daily bathing, and household cleaning. The ultimate goal of this research was to foster health-promoting behaviors leading to positive well-being outcomes, encompassing individual satisfaction, improved living conditions, and enhanced sanitation practices, ultimately contributing to optimal prosperity.

Furthermore, Florence Nightingale's Environmental Theory (6) supports the need for health-promoting behaviors related to sanitation. The theory suggests altering the environment to influence health changes, emphasizing concepts like ventilation, personal cleanliness, and cleanliness of the area, supporting the importance of proper sanitation for health promotion.

Carmelita Divinagracia's Composure Behavior Theory (7), focusing on health workers' values influencing individuals' well-being, aligns with the prioritization of sanitation by community health teams. Values upheld by community workers can impact residents' perceptions of such practices. Additionally, Cecillia Laurente's Theory of Nursing Practice (8) highlights effective communication, using the family as an entry point and tool to gain insight into patients' needs and concerns. Assessing residents'

perceptions based on presence, concern, and stimulation provides knowledge on grounding perceptions and improving sanitation behaviors.

In summary, the theories presented by Pender, Nightingale, Divinagracia, and Laurente underscore the importance of sanitation in promoting good health. Proper sanitation prevents health-threatening factors, and personal characteristics and perceived benefits or barriers can influence perceptions. These theories contribute to a constructive assessment of respondents' perceptions, offering recommendations for improving community wellness.

This study's independent variables encompassed age, gender, educational attainment, and family size, with a focus on sanitation practices as the dependent variable. The research aimed to fill a critical gap by investigating whether significant differences existed in residents' perceptions of sanitation practices before and during the COVID-19 pandemic, categorized by these demographic factors. Additionally, the study sought to identify which variable most accurately predicted respondents' sanitation perceptions. Addressing this gap is important as it provides nuanced insights into how demographic factors influence sanitation perceptions, crucial for developing targeted public health interventions. The null hypotheses posited that there are no significant differences in perceptions based on age, gender, educational attainment, and family size, and that no single variable best predicts these perceptions. Understanding these dynamics is vital for tailoring effective public health strategies and improving sanitation practices in communities.

Methods

Design

The study employed a descriptive quantitative design, facilitating the acquisition of empirical evidence about independent and dependent variables. This approach was crucial for achieving a comprehensive understanding of sanitation practices and the characteristics of respondents. By employing descriptive methods, the study could systematically describe the current state of sanitation perceptions among different demographic groups, providing detailed insights into how age, gender, educational attainment, and family size influence these perceptions.

Furthermore, the quantitative aspect of the research design enabled the collection of measurable data, which is essential for conducting rigorous statistical analysis. This method involved surveying a representative sample of the population, allowing the researchers to quantify variables and identify patterns and relationships. Quantitative data collection methods, widely used in market research, ensured that the study could objectively measure and compare sanitation perceptions across various demographic segments. By analyzing this data, the study could explore the strength and nature of relationships between demographic characteristics and sanitation perceptions, thereby offering valuable information for public health policy and intervention strategies (9).

Sample, sample size & sampling technique

The study took place in a subdivision community in Northern Mindanao, Philippines. Choosing this community as the official partner of the academic institution with which the researchers were affiliated during their Community Health Nursing (CHN) exposure provided advantages regarding contact and data collection. Additionally, the community is situated adjacent to another barangay in a different province and is elevated at approximately 254.4 meters above sea level. The elevated location presented challenges related to the stability of the water supply, leading residents to rely on communal water sources. The current elevation also posed connectivity issues, potentially impacting health awareness initiatives related to sanitation.

The inclusion criteria for the study respondents were residents of the designated community, aged between 18 and 65 years old, without diagnosed mental disorders, and willing to sign an informed consent form. Conversely, the exclusion criteria involved non-residents of the designated community, minors, individuals aged above 65 years old, and residents diagnosed with mental problems.

Moreover, as the study aimed to examine respondents' perceptions of sanitary practices, the potential risks during the research process were low. Only questions suitable for

the respondents' knowledge level were selected after carefully examining the literature and evidence. Respondents signed consent forms after understanding the study's methodology, benefits, and risks.

Respondents were chosen through simple random sampling, employing Cochran's formula for sample size determination. Simple random sampling is a technique where every member of a population has an equal probability of being chosen for the sample. This method was implemented by assigning a unique identifier to each of the 1,152 residents in the study population and then using a random number generator to select 289 individuals. This process ensured that the sample was free from selection bias, capturing the fundamental characteristics of the population and accurately representing the entire group under investigation.

The use of simple random sampling was crucial to ensure that each member had an equal opportunity of inclusion, thereby enhancing the generalizability of the findings. This probabilistic approach was particularly important given the researchers' objective to evaluate the relationships between independent variables (age, gender, educational attainment, family size) and the dependent variable (sanitation perceptions). By minimizing selection bias through random sampling, the study could more reliably investigate these relationships.

Cochran's formula was applied to determine the optimal sample size, taking into account the desired confidence level and margin of error. This calculation indicated that a sample size of 289 respondents would be sufficient to achieve statistically significant results. Thus, simple random sampling, combined with Cochran's formula, provided a robust methodological foundation for the study, ensuring the reliability and validity of the collected data.

Data collection process

The data collection process involved initially assessing the survey questionnaire by expert raters, conducting pilot testing with 36 residents from another barangay, and performing a reliability assessment using Cronbach's alpha. After obtaining necessary approvals, the formal data collection process began, ensuring informed consent from respondents, respecting their rights to refuse or withdraw, and prioritizing harm-free interactions while respecting privacy and confidentiality.

The instrument of data collection

Data collection was conducted using a researcher-made questionnaire structured into two sections. The initial segment involved gathering demographic information from respondents, while the subsequent section delved into their perceptions regarding sanitation practices. The demographic section employed a checklist or matrix format, allowing respondents to select relevant options based on their circumstances. On the other hand, the perception section incorporated both close-ended questions and Likert scale responses, offering choices like "Strongly Agree," "Agree," "Disagree," and "Strongly Disagree." An interval scale was established to assess any notable variations in the data gathered.

Data analysis

Inferential analysis was employed in the study. It is a statistical method to conclude a specific population, particularly when exploring potential connections between variables and their implications for the described group. ANOVA, t-tests, and F-tests were applied to identify significant differences among variables and assess whether the research hypotheses were supported or rejected. The calculation of the t-value, compared to a critical value or p-value threshold, allowed researchers to determine the statistical significance of observed differences. Additionally, the F-test was utilized to compare variances among two or more groups or conditions, evaluating whether observed differences in variances were statistically significant or attributed to random variability.

Furthermore, multiple regression analysis was utilized to examine the connection between several independent variables and a single dependent variable (10), identifying the most influential predictor among the independent variables. This statistical method utilized the beta coefficient to determine how changes in independent variables influenced

variations in the dependent variable. It is crucial to acknowledge that this analysis assumes a low correlation among independent variables and the applicability of results to the studied population.

Ethical consideration

Acknowledging ethical considerations in research is crucial (11). These principles guided the research, emphasizing scientific integrity, protecting respondents' rights, and enhancing research validity (12). Additionally, they ensured the safety of students, staff, and the university conducting the research. In this research, obtaining informed consent and ensuring voluntary participation were prerequisites before conducting the study. Respondents had the right to refuse and withdraw from the study. The researchers prioritized a harm-free interaction with respondents, respected their privacy in line with the Data Privacy Act, and presented information accurately. Most importantly, the study received ethics clearance approval from the Xavier University Research Ethics Board (XU REC Package No. NSG-2023001286) before conducting the survey.

RESULTS

Table 1 presents the respondents' perception of sanitation practices when grouped according to age. Before the COVID-19 pandemic, respondents aged 65 and above exhibited the highest perception of sanitation practices, with a mean average of 3.78. Conversely, during the pandemic, the highest level of perception of sanitation practices was observed among respondents aged 45 to 54, with a mean average of 3.74. Those aged 18 to 24 had the lowest perception of sanitation practices before and during the pandemic. This finding suggests that younger residents generally have a lower understanding of the significance of sanitation practices and their relevance to their well-being. An F-test or ANOVA yielded p-values of 0.029 and <0.01 before and after the pandemic. Both p-values being less than 0.05 indicate significance. Therefore, the hypothesis is rejected, and there is a significant difference in the level of perception of sanitation practices among barangay residents before the COVID-19 pandemic and a highly significant difference during the pandemic when grouped according to age.

Table 1. The results of respondent's level of perception on sanitation practices when grouped according to age, gender, educational attainment, and family size

		Level of Perception on Sanitation Practices			
		Before COVID-19 Pandemic		During COVID-19 Pandemic	
Variable		Mean	p-value	Mean	p-value
Age	18-24	3.43	0.029*	3.43	<0.01**
	25-34	3.56		3.58	
	35-44	3.63		3.65	
	45-54	3.66		3.74	
	55-64	3.59		3.52	
	Above 64	3.78		3.71	
Gender	Male	3.48	0.006**	3.48	<0.01**
	Female	3.62		3.66	
Educational Attainment	Elementary Level	3.58	0.034*	3.67	0.485 ns
	Junior High School Level	3.56		3.59	
	Senior High School Level	3.41		3.50	
	College Level	3.65		3.60	
	Post-graduate Level	3.40		3.59	
Family Size	1-4	3.64	0.019*	3.63	0.118 ns
	4-8	3.52		3.56	
	9 and above	3.40		3.44	

Legend: ns = Not Significant *=Significant **=Highly Significant

Table 1 also presents the respondents' perception of sanitation practices when grouped according to gender. Before and during the COVID-19 pandemic, females exhibited a higher perception of sanitation practices than males. The perception of sanitation practices among females increased during the pandemic, while males' perceptions did not significantly change. A t-test yielded p-values of 0.006 and <0.01 before and after the pandemic. Both p-values being less than 0.05 indicate significance. Therefore, the hypothesis is rejected, and there is a highly significant difference in the level of perception of sanitation practices among barangay residents before and during the COVID-19 pandemic when grouped according to gender.

Table 1 summarizes the respondents' perception of sanitation practices when grouped according to their educational attainment. Before the COVID-19 pandemic, respondents who were college graduates had the highest level of perception of sanitation practices, with a mean average of 3.65. However, during the pandemic, the highest perception of sanitation practices was observed among respondents who had reached only an elementary level of education. Those who pursued post-graduate studies had the lowest perception of sanitation practices before the pandemic (mean of 3.40). In contrast, after the pandemic, those with senior high school as their highest educational attainment had the lowest mean of 3.50. An F-test or ANOVA was utilized, producing p-values of 0.034 and 0.485 before and after the pandemic. Hence, the hypothesis is rejected, and there is a significant difference in the level of perception of sanitation practices among barangay residents only before the COVID-19 pandemic when grouped according to educational attainment. This result implies that educational attainment no longer significantly influences sanitation practices and perceptions during the pandemic.

.

Table 1 also presents the respondents' perception of sanitation practices when grouped according to their family size. Before and during the COVID-19 pandemic, respondents with small family sizes of 1 to 4 members exhibited the highest perception of sanitation practices, with mean averages of 3.64 and 3.63, respectively. Conversely, those from more prominent families with nine or more members consistently demonstrated the lowest sanitation perceptions. An F-test or ANOVA yielded p-values of 0.019 and 0.118 before and after the pandemic. Therefore, the hypothesis is rejected, indicating a significant difference in the level of perception of sanitation practices among barangay residents only before the COVID-19 pandemic when grouped according to their family size. This result suggests that family size no longer maintains a significant relationship with individuals' level of perception of sanitation practices during the pandemic.

Based on the p-values above, gender emerged as the variable that best predicted the respondents' perceptions of sanitation practices. Both before and during the pandemic, the p-values associated with the gender variable were 0.006 and <0.01, respectively. Both p-values were less than 0.01, indicating a significant relationship between gender and the level of perception of sanitation practices among the respondents. The null hypothesis was rejected, confirming that gender is the variable that best predicts the perceptions of sanitation practices.

Table 2 presents the multiple regression results of the independent variables in the study, considering the level of perception of sanitation practices as the dependent variable. Age exhibited the highest impact on the dependent variable, with the highest β-coefficient of 0.173, followed by family size at -0.154 and gender at 0.152

Table 2. Multiple Regression Results of Respondent's Level of Perception on Sanitation Practices Before the COVID-19 Pandemic

	Unstandardized Coefficients		Standard Coefficients Beta	t	Significance
	B	Std. Error			

Constant	3.282	.142		23.143	.000
Age	.056	.020	.173	2.889	.004
Gender	.138	.052	.152	2.663	.008
Educational Level	.035	.024	.086	1.450	.148
Family Size	-.115	.043	-.154	-2.685	.008

Dependent Variable: Level of Perception on Sanitation Practices Before the Pandemic

Table 3 presents the multiple regression results of the independent variables in the study, considering the level of perception of sanitation practices as the dependent variable. Gender demonstrated the highest impact on the dependent variable, with the highest β-coefficient of 0.207, followed by age with 0.173, and then family size with -0.111

.

Table 3. Multiple Regression Results of Respondent's Level of Perception on Sanitation Practices During the COVID-19 Pandemic

	Unstandardized Coefficients		Standard Coefficients Beta	t	Significance
	B	Std. Error			
Constant	3.283	.130		25.286	.000
Age	.052	.018	.173	2.902	.004
Gender	.172	.048	.207	3.626	.000
Educational Level	.004	.022	.011	.183	.855
Family Size	-.076	.039	-.111	-1.944	.053

Dependent Variable: Level of Perception on Sanitation Practices During the Pandemic

Discussion

In line with the research by Yang et al. (13), adolescents, young adults, and middle-aged individuals demonstrated greater health literacy compared to other age cohorts, including older adults. This observation is consistent with the statistical analysis, which showed that respondents aged 45 to 54 exhibited the highest awareness of sanitation practices during the pandemic. This correlation suggests that middle-aged individuals might be more proactive in seeking and absorbing current health-related information. As a result, their heightened health literacy enables them to take more effective measures to mitigate health risks such as COVID-19 and adhere to proper sanitation practices.

One possible reason why older adults were less concerned about COVID-19 compared to middle-aged individuals is their higher adherence to social distancing and hygiene measures. Alkhaldi et al. (14) found that individuals who followed these precautions were less likely to report anxiety related to the pandemic. Older adults, who are generally more cautious and follow health guidelines more closely, may have felt more secure in their actions, leading to lower anxiety levels. This outcome is significant because it highlights the importance of public health measures in mitigating anxiety during a health crisis. It also underscores the need to promote these measures across all age groups to support mental well-being.

According to Wendland et al. (15), women assumed the role of primary caretakers responsible for managing household water supply, sanitation, and health. Consequently, they were recognized as advocates and educators promoting health sanitation practices. The study further highlighted that women faced more significant challenges due to inadequate sanitation, influenced by gender differences.

Additionally, a study conducted in Washington by Ipsos (16) concluded that women demonstrated more concern about personal hygiene than men, particularly regarding self-image. In this study, 81% of women interviewed described themselves as very clean, in contrast to 72% of men who referred to themselves as just clean. These findings align with the study results, emphasizing that females exhibit greater awareness and mindfulness regarding their

sanitary practices than men, substantiating the significant difference between genders.

A study by Thakadu et al. (17) highlighted a significant link between the infection rates of diseases like diarrhea, malaria, bilharzia, and cholera and educational attainment. It revealed that low educational attainment was associated with the poor need for more sanitation knowledge. Additionally, Toquero (18) asserted that individuals with higher educational attainment were more likely to engage in preventive health measures, indicating a strong correlation between one's perception of sanitation and one's level of education.

Moreover, the study by Co et al. (19) indicated that limited health literacy exhibited an inverse relationship with higher educational attainment. Those with higher educational levels were better equipped to understand health promotion and prevention concepts. The study also emphasized the challenge of determining an individual's health literacy solely based on educational attainment. However, the present study's findings suggest a notable difference, indicating that a person's level of education only significantly influences the perception of sanitation practices.

Furthermore, despite the government providing ample information to the public about the importance of proper sanitation practices, such as handwashing, daily bathing, and household cleaning, especially during the peak of the COVID-19 pandemic, educational attainment remained a minor factor. This insight was because relevant government units reinforced health education efforts.

Family size was found to positively correlate with accessibility to water resources, as indicated by Tshililo et al. (20). This correlation could be attributed to the increased workforce available within larger families to procure the necessary water for sanitation activities. However, during the pandemic, substantial reductions in water consumption from facilities like resorts and shopping malls prompted water suppliers to concentrate more on distributing water to households. This increased water availability to meet household demands during quarantine led to a reduction in workforce needs. Consequently, family size had only a minimal effect on the sanitation capabilities of households.

Moreover, increased demand during the pandemic contributed to enhanced efforts in renovating water supply systems. Before the pandemic, inadequate water supply systems decreased water availability to households, making family size a significant factor, as larger families could procure more water supplies for sanitation.

Soboksa et al. (21) demonstrated an increased incidence of diarrhea in families with larger family sizes. This result could be linked to decreased parental attention to each child within larger households. However, with the implementation of quarantine protocols during the pandemic, parents staying at home had the opportunity to focus better on their children's wellness and sanitation, regardless of the number of children. This scenario contrasts with the situation before the pandemic, where parents were occupied with their respective livelihoods. Therefore, larger families would have had more significant perceptions of sanitation before the pandemic when family members were not primarily focused on the home setting.

Wendland et al. (15) highlighted the distinct roles of women and men in sanitation, emphasizing that women traditionally served as the primary caretakers responsible for managing household water supply and sanitation. They were recognized as promoters and educators of health sanitation practices, a more pronounced role than men. This dynamic is observed in the Philippines, where mothers, regardless of age, educational attainment, and family size, exhibit meticulous care regarding the sanitation of their children to prevent the occurrence of fever and infectious diseases (15). Such attitudes are deeply rooted in the community's culture. Additionally, women were found to be more adversely affected by inadequate sanitation due to gender-related differences, such as the use of napkins and sanitary materials, reflected in increased supplies of these materials in shopping malls and convenience stores (15).

Similarly, Hunt (22) noted that "women are more focused on care than men." Hunt (22) suggested that this difference could be attributed to men having a greater sense of invincibility and a "macho" attitude toward fearing germs. This observation is particularly relevant in the Philippines, a predominantly patriarchal society, where men might be

inclined to perceive themselves as too "macho" to fear germs. As a result, women tend to exhibit greater sensitivity to cleanliness and sanitation, highlighting their increased attention to these practices compared to men.

While gender emerged as the primary predictor based on p-values, age substantially influenced sanitation practices before the COVID-19 pandemic. Barcenilla-Guitard et al. (23) established the significant role of age in individuals' comprehension and adoption of hand sanitation practices, particularly in the Philippine context, where adults were perceived as teachers guiding younger generations in maintaining health through sanitation. Before the pandemic, the government's health education efforts were less extensive and impactful, prompting individuals to rely more on learning from their elders and family members at home regarding proper hand sanitation practices.

Throughout the pandemic, gender significantly shaped the sanitation practices of the respondents compared to other independent variables, aligning with the findings based on p-values. Women assumed pivotal roles in caring for their families during the quarantine seasons, demonstrating increased vigilance in ensuring handwashing and household cleaning compared to men. This proactive approach by women contributed to the resilience of Filipino families and effectively curbed the spread of COVID-19.

Conclusion

The study determined that age and gender significantly influenced perceptions of sanitation practices before and during the COVID-19 pandemic. Specifically, older adults tended to have more established perceptions of sanitation, while females exhibited higher awareness and engagement in sanitation practices. One implication of the study is the importance of targeted health education efforts. For instance, interventions should be tailored to younger age groups to strengthen their perceptions, while reinforcing correct views among older age groups can be beneficial. Similarly, addressing gender disparities and implementing inclusive approaches are crucial for promoting equitable access to sanitation and fostering better perceptions among all individuals.

A strength of the study lies in its comprehensive analysis of demographic factors and their impact on sanitation perceptions. However, a limitation is the non-significance of educational attainment and family size during the pandemic. This suggests the need for ongoing and consistent health education efforts to maintain appropriate perceptions and knowledge regarding sanitation.

The study emphasizes the importance of tailored health education efforts, particularly concerning age and gender, to maintain positive sanitation perceptions and ensure long-term behavioral change beyond the pandemic. Future research could delve deeper into additional factors influencing sanitation perceptions and explore strategies for sustaining positive perceptions in diverse demographic groups.

Acknowledgements: The authors would like to thank all respondents who took part in this study.

Conflict of interests: The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding: No external funding for this study was received

References

(1) World Health Organization. Sanitation [Internet]. 2022 Mar 21 [cited 2022 Dec 14]. Available from: https://www.who.int/news-room/fact-sheets/detail/sanitation

(2) Centers for Disease Control and Prevention. Sanitation & Hygiene Home [Internet]. 2021 Dec 9 [cited 2022 Sep 10]. Centers for Disease Control and Prevention. Available from: https://www.cdc.gov/healthywater/global/sanitation/index.html

(3) Lopez V. Gasoline is alternative to alcohol as disinfectant, Duterte insists. GMA News Online [Internet]. 2020 [cited 2022 Dec 14]. Available from: https://www.gmanetwork.com/news/topstories/nation/749307/gasoline-is-alternative-to-alcohol-as-disinfectant-duterte-insists/story/

(4) Petiprin A. Pender's Health Promotion Model. Nursing Theory [Internet]. 2020 Jul

21 [cited 2022 Dec 14]. Available from: https://nursing-theory.org/theories-and-models/pender-health-promotion-model.php
(5) Aqtam I, Darawwad M. Health Promotion Model: An Integrative Literature Review. Open Journal of Nursing. 2018;8:485-503. doi:10.4236/ojn.2018.87037
(6) Petiprin A. Nightingale's Environment Theory [Internet]. 2020 [cited 2022 Dec 14]. Available from: https://nursing-theory.org/theories-and-models/nightingale-environment-theory.php
(7) Divinagracia C. COMPOSURE Behavior of the Advanced Nurse Practitioner on the Wellness Outcome of Selected Cardiac Patients at Philippine Heart Center [Dissertation]. University of the Philippines College of Nursing Library, Manila, Philippines; 2001.
(8) Monato JA. Theory of Nursing Practice and Career by Cecilia Laurente [Internet]. 2021 [cited 2021 Jan 17]. Available from: https://www.studocu.com/ph/document/far-easternuniversity/theoretical-foundations-in-nursing/theory-ofnursing-practice-and-career-by-cecilia-laurente/20942229?fbclid=IwAR3BOBSXJoqIvkzHoraIfWXj7_ke9Z3BJ38JU4LwTEHw3qSgt9-4UMRfyUI
(9) Bhat A. Descriptive research: Characteristics, methods + examples [Internet]. 2023 May 4 [cited 2022 Nov 10]. QuestionPro. Available from: https://www.questionpro.com/blog/descriptive-research/
(10) Hayes A. Multiple linear regression (MLR) definition, formula, and example. Investopedia [Internet]. 2022 [cited 2022 Dec 13]. Available from: https://www.investopedia.com/terms/m/mlr.asp
(11) Polonsky M, Waller D. Designing and Managing a Research Project: A Business Student Guide. Sage Research Methods; 2019. DOI:https://dx.doi.org/10.4135/9781544316499
(12) Bhandari P. Ethical Considerations in Research | Types & Examples [Internet]. 2022 [cited 2022 Nov 10]. Available from: https://www.scribbr.com/methodology/research-ethics/
(13) Yang P, Ou Y, Yang H, Pei X, Li J, Wang Y, et al. Research on influencing factors and dimensions of health literacy in different age groups: Before and after the covid-19 ERA in Chongqing, China. Frontiers in Public Health. 2021;9. doi:10.3389/fpubh.2021.690525
(14) Ghadah Alkhaldi, Aljuraiban GS, Alhurishi SA, Roberta De Souza, Kethakie Lamahewa, et al. Perceptions towards COVID-19 and adoption of preventive measures among the public in Saudi Arabia: a cross sectional study. BMC Public Health. 2021;21(1). doi:10.1186/s12889-021-11223-8
(15) Wendland C, Yadav M, Stock A, Seager J. Gender, women and sanitation. In: Rose JB, Jiménez-Cisneros B, editors. Water and sanitation for the 21st century: Health and microbiological aspects of excreta and wastewater management. Michigan State University, E. Lansing, MI, UNESCO; 2018. doi:10.14321/waterpathogens
(16) Ipsos. Hygiene and cleanliness in the U.S. [Internet]. 2018 [cited 2022 Oct 3]. Available from: https://www.ipsos.com/en-us/news-polls/Hygiene-and-Cleanliness
(17) Thakadu OT, Ngwenya BN, Phaladze NA, Bolaane B. Sanitation and hygiene practices among primary school learners in Ngamiland district, Botswana. Physics and Chemistry of The Earth. 2018;105. doi://doi.orr/10.1016/j.pce.2018.02.006
(18) Toquero CM. Challenges and opportunities for higher education amid the COVID-19 pandemic: The Philippine context. Pedagogical Research. 2020;5(4):em0063. doi:10.29333/pr/7947
(19) Co KD, Chang PS, Mamangon MM, Mendoza OM, Mira NC, Quizon RR, et al. Prevalence of limited health literacy in the Philippines: First national survey. Health Literacy Research and Practice. 2022;6(2):e104-e112. doi:10.3928/24748307-20220419-01
(20) Tshililo FP, et al. Analysis of the determinants of household's water access and payments among the urban poor. A case study of Diepsloot Township. Physics and Chemistry of the Earth, Parts A/B/C. 2022;127:103183. doi:10.1016/j.scs.2022.104186

(21) Soboksa N, Gari S, Hailu A, Alemu B. Association between microbial water quality, sanitation and hygiene practices and childhood diarrhea in Kersa and Omo Nada districts of Jimma Zone, Ethiopia. PLoS ONE. 2020;15(2). doi:10.1371/journal.pone.0229303

(22) Hunt K. Men wash their hands much less often than women and that matters more than ever. CNN [Internet]. 2020 Apr 1 [cited 2022 Oct 11]. Available from: https://edition.cnn.com/2020/04/01/health/handwashing-gender-gap-wellness/index.html

(23) Barcenilla-Guitard M, Espart A. Hygiene in young adults: A cross-sectional study in the COVID-19 pandemic context. International Journal of Environmental Research and Public Health. 2021;18(24):13016. doi:10.3390/ijerph182413016