

## Exploring Hand Hygiene Practices for Preventing Influenza Infections among Botswana University Students during the Peak Pandemic Period

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### Abstract

*During influenza pandemics, university settings with huge number of students who are highly active and mobile can become serious outbreak centres. As outbreak management is crucial for disease control, the current research aimed to explore hand hygiene practices to prevent influenza infections among Botswana university students during the peak of the pandemic. A quantitative, cross-sectional study was performed by collecting data from 200 Botswana university students during peak influenza season. Data was analysed using descriptive statistics. The findings showed significant insights on hand hygiene knowledge, attitudes, behaviours and practices of Botswana university students towards preventing influenza infection. The study demonstrates that Botswana university students hold strong positive attitudes, mixed levels of knowledge and compliant behaviours regarding hand hygiene for influenza prevention. The narrowing knowledge–practice gap and resourceful use of soap, water, sanitisers and wipes indicated effective internalisation of technical guidance while low adherence to the 20-second handwashing rule underscored the need for health educational campaigns. Findings also indicated that relying on self-reports, lower confidence in biomedical interventions and persistent structural barriers (costs, facilities, forgetfulness) signals ongoing vulnerabilities. Future research should incorporate objective behavioural or clinical measures, qualitative exploration of vaccine and mask hesitancy, and intervention trials that integrate behavioural practices with improved infrastructural support to ensure effective prevention of influenza.*

**Keywords:** *Attitude, Hand Hygiene, Influenza, Knowledge, Pandemic, Practices.*

### Introduction

#### Study Background

As a highly contagious illness, influenza remains a major global health problem due to its ability to cause widespread seasonal epidemics and occasional pandemics [1]. According to [2], influenza affects between 5–15% of the world's population annually, accounting for about 290,000 to 650,000 deaths which outpaces fatalities from all other vaccine preventable diseases. The influenza virus can be transmitted by infected persons within 24 hours prior to symptoms onset. Individuals with compromised health are at increased risk of

infection which leads to significant community or institutional outbreaks [2, 3] noted that university settings can be particularly vulnerable during influenza outbreaks due to large concentration of young adults who are highly mobile and interactive. In Botswana, public health authorities have advocated for basic preventive measures during pandemic periods. During influenza and COVID-19 pandemics for instance, authorities considered frequent handwashing with soap and water as an effective way to reduce viral transmissions [4].

In reducing microbial transmission, alcohol-based hand sanitisers and frequent

handwashing are widely viewed as the key to infection prevention [5]. Leading organisations like WHO and CDC report that effective hand hygiene is crucial in mitigating how infectious diseases spread [6]. While reducing person-to-person transmission of viruses through contaminated hands and surfaces, hand hygiene has been preferred due to simplicity, accessibility and evidence of effectiveness. When there is influenza outbreak, the relevance of hand hygiene practices intensifies due to increased incidence of viral infections. Against this background, understanding the knowledge, attitudes and practices (KAP) among communities in regards to hand hygiene during influenza season is crucial for developing targeted public health interventions.

To align with recommended practices, the knowledge on how influenza is transmitted as well as the effectiveness of hand hygiene practices in reducing infections becomes a necessity. Existing research holds that increased awareness of how influenza is transmitted present positive effects on adherence to hand hygiene practices [7]. However, other researches highlight gaps in public knowledge when determining specifics of hand hygiene like duration of handwashing, use of hand sanitisers or appropriate techniques [8]. At the same time, attitudes towards hand hygiene practices during influenza outbreaks has significant influence on behavioural patterns. In particular, positive attitudes towards hand hygiene that includes perceived severity of contracting influenza usually predict higher adherence to regular handwashing [9]. Contrary to these, underestimation or misconceptions about influenza virus can result in complacency or limited handwashing practices [1]. Across populations, consistency, contexts and technique of hand hygiene practices varies significantly. This evident in cross-sectional studies among students which have shown maintenance of hand hygiene standards to be universally inconsistent [3, 10].

Together, there dynamic and complex relationship between knowledge, attitudes and practices surrounding influenza prevention. Whereas enhanced knowledge may result in more positive attitudes that encourage better practices, higher knowledge and positive attitudes could be affected by limited access to handwashing facilities that affect implementation of recommended hand hygiene practices [11, 12]. In light of these, the current research aims at exploring the knowledge, attitudes, behaviours and practices of Batswana university students in regards to hand hygiene practices that prevent influenza by underscoring the importance of proper and consistent hand hygiene practices during influenza season.

### **Research Problem**

According to [13], Botswana remains vulnerable to pandemic-prone respiratory diseases that includes seasonal influenza which occurs throughout the year but peaks between April and October. Recent experiences with COVID-19 and previous influenza outbreaks have exposed gaps in influenza outbreak preparedness and highlighted the need for robust preventive practices in communities. In February 2024, the Ministry of Health reported a surge in influenza-like illness cases across Botswana (8,627 per week) and explicitly urged the public to “*follow hand hygiene protocols*” as protective measure [14]. Such call to action reflects practical consensus that encouraging hand hygiene is a critical strategy to reduce influenza transmission in community settings. However, it also raises important questions about compliance and effectiveness at population level.

While health authorities can recommend frequent handwashing, the actual attitudes and behaviours of individuals especially young adults such as university students determine how well these measures are adopted in practice [3]. Given that university students are highly mobile and socially active, they can act as

vectors for viral spread both on campus and in their communities. In Botswana, the uptake and effectiveness of hand hygiene practices among university students have not been well documented.

Additionally, the majority of existing research on hand hygiene and influenza prevention comes from high-income countries, healthcare environments or other settings. For instance, [1] evaluated the knowledge, attitudes and practices concerning hand hygiene among Chinese healthcare workers and found that majority of healthcare workers have comprehensive knowledge, positive attitudes and practiced effective hand hygiene measures. Similarly, [2] showed that knowledge has significant influence on the attitudes and practices with regard to prevention of seasonal influenza among Singaporean healthcare workers. In German household settings, [15] found that facemasks and intensified hand hygiene practices can significantly reduce influenza transmission when used diligently. However, a review by [5] demonstrated that hand hygiene education and practices may not be effective against influenza, with inconsistent evidence on how frequently hand hygiene should be performed. These studies highlight inconsistencies and significant research gaps that is worthy of investigation from the context of Botswana university students.

### **Research Significance**

Theoretically, this study will contribute to the body of knowledge on the knowledge–attitude–practice (KAP) framework of health behaviours by examining it in a sub-Saharan African university context. It will shed light on whether global findings about hand hygiene’s role in influenza prevention could be transferred to Botswana university students, thereby extending current theories of health behaviour to new population. From practical perspective, the research findings can guide campus health policies and national influenza preparedness plans. If certain misconceptions

or barriers to handwashing are identified, university health services and public health authorities in Botswana can design more effective awareness campaigns or facility improvements such as installing more handwashing stations. Moreover, by evaluating how effective students’ hygiene practices are during peak influenza period, this research could inform whether additional interventions such as providing hand sanitizers or integrating hand hygiene education into curricula are warranted to protect student health.

### **Research Aim and Specific Research Questions**

In line with the above, this research explores hand hygiene practices for preventing influenza infections among Botswana university students during the peak pandemic period. The specific research questions are crucial in answering the research aim.

1. What are the attitudes of Botswana university students towards hand hygiene practices for preventing influenza infections?
2. What are the knowledge and behaviours of Botswana university students associated with hand hygiene for preventing influenza infections?
3. How effective are the hand hygiene practices adopted for preventing influenza transmissions among Botswana university students?

### **Research Methods**

#### **Research Designs**

The current research deployed quantitative research design to explore the effectiveness of hand hygiene practices for preventing influenza infections among Botswana university students during the peak pandemic period. According to [16], quantitative research designs focusses on exploring the relationships between variables by collecting numerical data from several research subjects that are analysed through statistical methods. To gather quantitative data,

the researcher can utilise survey questionnaires, observations or experiments. In this study, quantitative research design allows the researcher to explore the relationship between Botswana university students' attitudes and the adopted hand hygiene practices for influenza prevention. More specifically, a quantitative design enables the researcher to examine whether knowledge levels predict students' attitudes and behaviours regarding hand hygiene measures to prevent influenza. However, a qualitative research design would be inappropriate for this study, given that it involves fewer research subjects, which reduces sample representativeness and thus affects the validity of the research findings [17].

In addition to quantitative design, this research deploys a cross-sectional design, which gathers data from participants at a single point in time or over a short period to capture a "snapshot" of the variables of interest [18]. In this research, the cross-section will coincide with the peak influenza period, that is, during the winter months when influenza cases traditionally surge or during a pandemic wave). This design is appropriate for assessing prevalence and relationships. For example, what proportion of students have good handwashing practices and do those who practice more report fewer illnesses at that time. However, it does not establish causality definitively since we are not manipulating variables or observing changes over time, but it is efficient and suitable for exploratory and correlational analysis in a natural setting [19].

### **Study Area and Participants Sampling**

Participants were recruited from University of Botswana, a public university located within Gaborone city with student population of about 19,000 [20]. As the largest and most representative university, the institution is suitable for exploring the knowledge, attitudes, behaviours and practices associated with prevention of influenza during outbreaks. The research participants were recruited through

convenience sampling strategy because it selects subjects based on ease of access and availability [21]. The students were recruited through active class WhatsApp groups where those with flu or flu-like symptoms. While convenience sampling allowed the researcher to gather data quickly and cost-effectively from readily available subjects, it has inherent limitations. For instance, [22] observed that the sample may be unrepresentative of the broader population which results in biasness. To ensure sample representativeness, the researcher recruited subjects from active class WhatsApp groups, official university communication channels and social media groups frequented by students. About 200 students were recruited into the study.

### **Data Collection Method**

The quantitative data was collected through online survey questionnaires which gathers large volumes of quantitative data from several research participants within a short time [23]. This implies that the researcher collected large quantities of data from several students within the University of Botswana. This data can then be generalised to represent the wider population of students in Botswana. Given that survey questionnaires are closed-ended and the participants choose responses from the provided list, they are easy to analyse and compare which speeds up the research process. While survey questionnaires are effective for this research, they have low response rate which may affect representativeness of results [24]. To address this, the researcher sent follow up reminders to research participants to remind them to key in their responses and send.

When collecting data, the researcher sent participant information sheet which explains the research purpose, research questionnaires and any risks that may be involved. The questionnaire included detailed questions on demographic characteristics, attitudes towards hand hygiene practices, knowledge and behaviours towards hand hygiene protocols,

and reported hand hygiene practices. Questions on attitudes were used to assess students' perceptions towards influenza pandemic while questions on knowledge and behaviours were used to assess the student's general knowledge on pandemic influenza and recommended response measures. questions on the hand hygiene practices were used to assess actual adherence to practices. Participants who signs the consent form received an online questionnaire link on their WhatsApp account. They were then requested to fill in the questionnaires and submit their responses. The researcher targets to collect about 200 valid questionnaires.

### Data Analysis

Quantitative data were analysed using descriptive and inferential statistics. As noted by [25], descriptive statistical analysis describes and summarises the main characteristics of a dataset using measures of central tendency, measures of dispersion, frequency distributions, and graphical representations to understand patterns within the dataset. Through descriptive statistics, the researcher summarized the characteristics of study sample and distribution of attitudes, knowledge and hand hygiene practices adopted by Batswana university students to address influenza outbreak.

Inferential statistics such as correlation and regression analysis are used to determine the relationship between research variables [26]. Precisely, correlation analysis is ideal when examining the strength and direction of relationship between variables [26]. For this

research, correlation analysis will be used to determine the extent to which the knowledge levels affect the attitudes and behaviours of Batswana university students towards hand hygiene practices in addressing influenza pandemic. On the other hand, regression analysis aims to describe and predict relationships among interrelated variables [27]. In this study, regression analysis is used to determine how the attitudes and knowledge of Batswana university students affects their hand hygiene practices to prevent influenza transmission. Overall, quantitative findings are visualized using charts, tables or graphs to enhance understanding.

### Ethical Considerations

As this research involves collecting quantitative data from human subjects, the researcher first sought the informed consent of participants by providing consent form that explains the research purpose, questions, risks involved [28]. Only participants who signed the consent form were recruited. After recruitment, the participants were informed that their participation is voluntary and they can exit the research study at any time. The collected quantitative data were only accessed by the researcher to ensure that they do not get into unauthorised hands. While storing quantitative data, the researcher utilised password protection or encryption to prevent unauthorised access.

### Research Findings

#### Demographic Characteristics and Warm Up Questions

**Table 1.** Demographic Information and Warm Up Questions

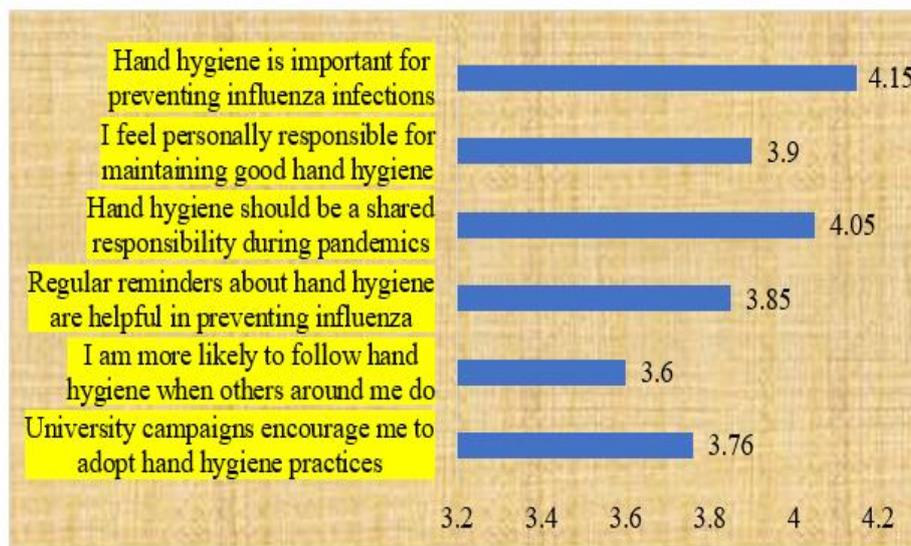
<b>Demographic information and warm up questions</b>		
	<b>Type</b>	<b>Percentage</b>
<b>Gender</b>	Male	49
	Female	51
<b>Age</b>	Under 20	25
	20-24	49
	25-29	18

	30 and above	8
<b>Current level of study</b>	Undergraduate	66%
	Diploma	25%
	Postgraduate	9%
<b>Have you received formal education or training on hand hygiene</b>	Yes	65
	No	24
	Not Sure	11
<b>Have you experienced flu or flu-like symptoms</b>	Yes	97
	No	3
<b>How often do you use public/shared university facilities</b>	Rarely	1
	Occasionally	2
	Frequently	22
	Daily	75

From table 1, it is evident that the gender of participants was 49% male and 51% female which aligns with [29] who noted that 52% of student population was female in University of Botswana with males accounting for 48%. Additionally, the data above showed that majority of the participants were young students aged between 20-24, less than 20 years and 25-29, which reflects the age group of university students. Of the sampled participants, 66% were undergraduate students with 25% taking diploma courses while 9% were post-graduate students. However, majority of the participants stated that they have received formal education or training with regards to hand hygiene practices. This

demonstrates that they are aware of hand hygiene practices that can reduce influenza transmission. Further, a significant 97% of participants acknowledged experiencing flu or flu-like symptoms which demonstrates their suitability for this research. Notably, majority of the participants stated that they often use public or shared university facilities like cafeteria, washroom, lecture halls and libraries on a daily or frequent basis. This implies that there are high chances of contracting influenza virus from the surfaces of facilities.

#### **Attitudes of Botswana University Students towards Hand Hygiene Practices that Prevent Influenza Infections**



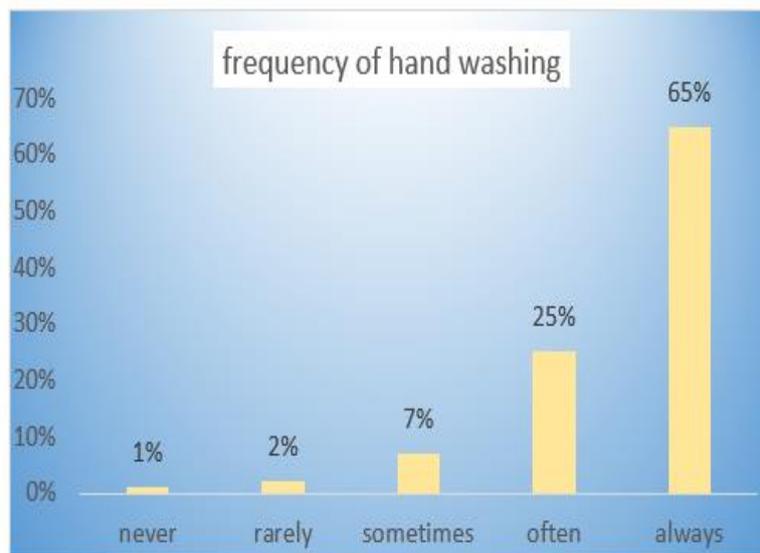
**Figure 1.** Attitudes Towards Hand Hygiene Practices

From Figure 1, the average score for each statement exceeds 3.5, indicating that the majority of participants have positive attitudes towards hygiene practices that prevent influenza infections. Specifically, the statement 'hand hygiene is important for preventing influenza infections' had the highest average of 4.15, indicating strong student consensus in recognising the importance of hand hygiene in preventing disease, suggesting widespread health risk awareness. Additionally, the statement 'Hand hygiene should be a shared responsibility during pandemics' posted a higher average score of 4.05. This implies that students view hygiene not only as a personal duty but also as a social duty during public health crises. Further, item 'I feel personally responsible for maintaining good hand hygiene' generated higher mean score of 3.9. this high score reflects strong individual

accountability, showing that university students acknowledge their role in disease prevention. However, the statement 'I am more likely to follow hand hygiene when others around me do' posted a moderate score of 3.6, which suggests moderate peer influence, indicating social modelling matters, but internal motivation may play a stronger role in their behaviour.

### **Knowledge and Behaviours of Botswana University Students associated with Hand Hygiene for Preventing influenza Infections**

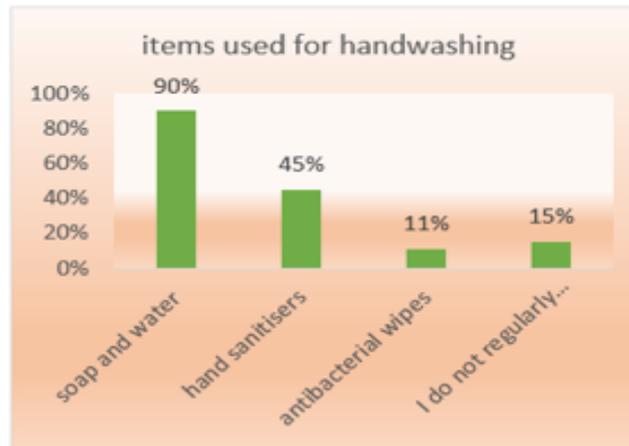
From the quantitative results, majority of participants stated that they frequently washed their hands after using public or shared surfaces during influenza seasons (figure 2 below). This indicates that they are knowledgeable and actively practice precautions that can limit influenza transmission.



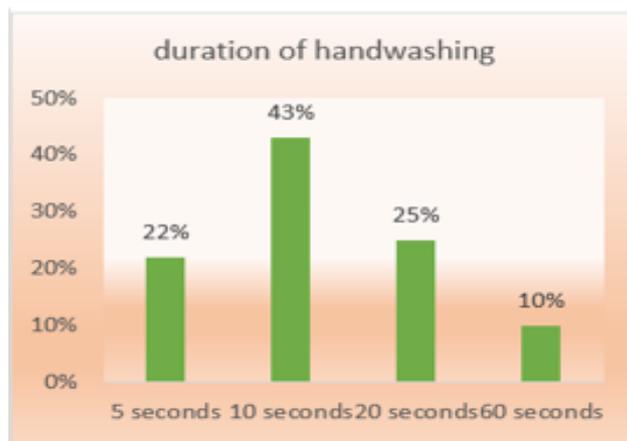
**Figure 2.** Frequency of Handwashing

Additionally, a significant proportion of students (90%) reported using soap and water regularly for hand hygiene, while 45% utilised hand sanitiser (figure 3). Only 11% utilised antibacterial wipes. Further, the majority of

students (43%) indicated that they wash their hands for 10 seconds to remove the influenza-causing virus, while 25% showed that they wash their hands for 20 seconds, with only 22% washing their hands for 5 seconds (figure 4).



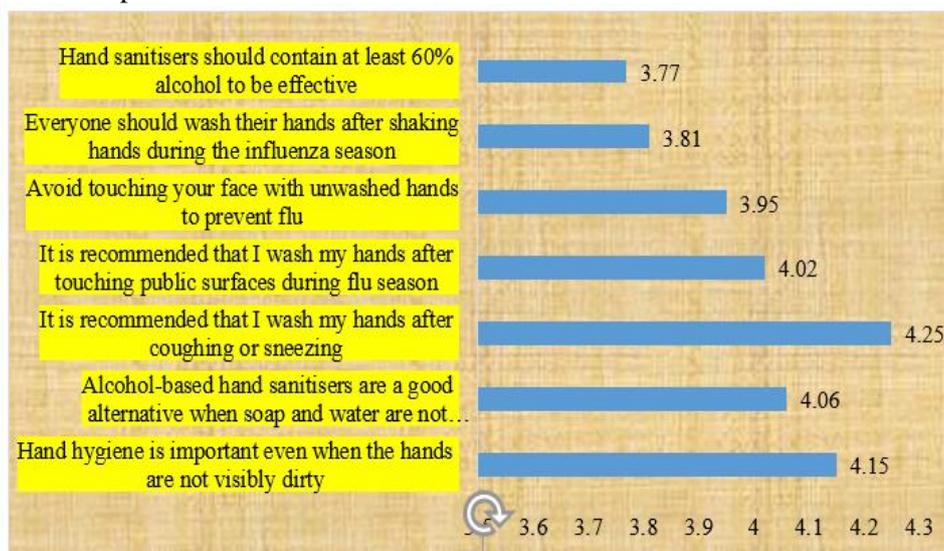
**Figure 3.** Items used for Handwashing



**Figure 4.** Duration of Handwashing

More important, Likert scale findings on the knowledge and behaviours of Batswana students towards prevention of influenza

transmission generated the following findings (figure 5).



**Figure 5.** Knowledge and Behaviours towards Hand Hygiene Practices during Influenza Season

From figure 5 above, the average mean score of each statement is higher than 3.5 which implies that majority of participants are knowledgeable and behave appropriately in regards to hand hygiene practices that prevent influenza infections. Precisely, the statement ‘It is recommended that I wash my hands after coughing or sneezing’ posted average highest score of 4.25. This reflects high compliance with one of the most emphasized hygiene behaviours in public health messaging during influenza outbreaks. Additionally, the statement ‘Hand hygiene is important even when the hands are not visibly dirty’ which generated average score of 4.15. Such a high score suggests strong conceptual understanding among students that pathogens can be invisible thus reflecting internalized knowledge from health education. However, the statement

‘Hand sanitisers should contain at least 60% alcohol to be effective’ posted moderate score of 3.77. This reflects limited technical knowledge regarding product efficacy, as students likely prioritise availability over content verification.

### Effectiveness of hand hygiene practices adopted for preventing influenza transmissions among Batswana university students

Based on quantitative results, a significant proportion of participants believed that handwashing, avoidance of crowds and social distancing contributed their reduction in influenza infections (Figure 6). However, only 35% and 13% of participants believed that facemasks and vaccination helped in reducing their chances of influenza infection.

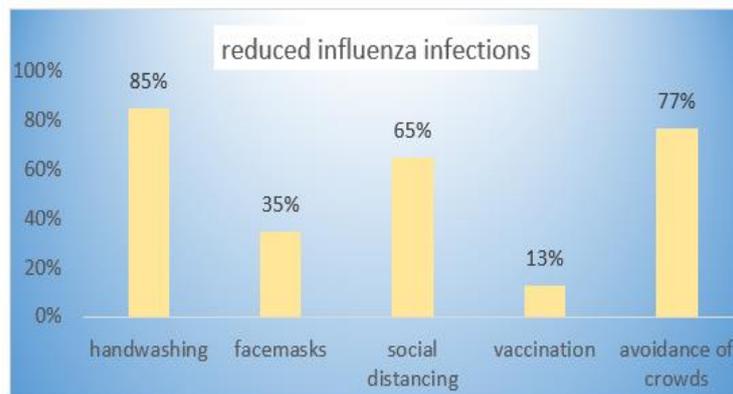


Figure 6. Reducing Influenza Infections

Additionally, a significant 87% of participants noticed reduction in influenza symptoms after adhering to hand hygiene practices with only 10% seeing no changes in symptom reduction (figure 7). Meanwhile, a

significant (82%) stated that they have not been diagnosed with influenza after practicing hand hygiene with 11% having contrary opinion (figure 8).

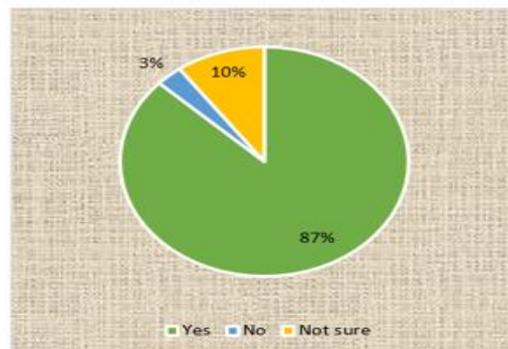
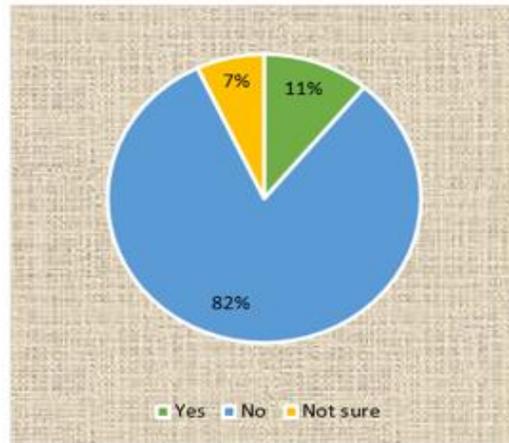


Figure 7. Reduction in Influenza Symptoms



**Figure 8.** Influenza Diagnosis

Further, majority of participants found soap and water as the most effective during influenza outbreaks with 22% stating alcohol based

sanitisers and 10% going for mix of soap, water and alcohol-based sanitisers (figure 9).



**Figure 9.** Effectiveness of Hand Hygiene Methods

More important, the participants highlighted forgetfulness, limited access to facilities, cost of sanitizers and soap as well as lack of

awareness as the challenges to hand hygiene practices (figure 10).



**Figure 10.** Challenges to Hand Hygiene Practices

## Discussion

### **Attitudes of Batswana University Students towards Hand Hygiene Practices to Prevent Influenza Infections**

Given that higher education institutions have the potential of becoming serious outbreak centres for influenza pandemic, the attitudes of university students towards pandemic are crucial for complying to health directives. The research findings above showed that Batswana university students have positive attitudes towards hygiene practices that prevent influenza infections. This stronger consensus could be due to effective health education and recent pandemic experiences which cultivate greater awareness. Research across different regions generally show high appreciation of handwashing's importance during public health crises. For instance, during the 2009 H1N1 influenza pandemic, [10] found that significant majority of Korean university students (over 95%) perceived hand washing as effective measure to prevent influenza transmission. In line with this, a recent post-COVID survey in the UAE [30] reported a positive attitude score of about 74.7%, reflecting strong endorsement of hygiene practices among university students.

Key finding is that the university students clearly viewed infection prevention as individual duty and collective social responsibility in times of crisis. Accordingly, the strong agreement among these students suggests they have internalized the notion of communal effort in disease prevention. This finding is backed by extant research which reveals that the highest rates of hand hygiene compliance occur when people perceive it as a collective duty rather than an isolated personal task [12]. However, these findings contradict prior research which focussed on individual knowledge and habits without explicitly measuring attitudes about collective action [31]. On this account, the current study holds that Botswana's strong communal ethic may have led to strong emphasis on shared

responsibility among the students. Another key finding indicated that Batswana students feel personally responsible for maintaining proper hand hygiene. This resonates with emphasis on personal duty that many health education campaigns promote. These results are confirmed by [32] who found that South African university students have very high hygiene attitude scores (91%) but that attitude was the strongest predictor of their hygiene practices more than knowledge. As such those who personally believed in the importance of hygiene were more likely to actually practice it. Contrary to these, handwashing compliance was influenced more by social pressure than by the students' own risk perception or attitude [33]. As such, this research suggests that the students are less reliant on external pressure and more driven by internal motivation to maintain hygiene.

More important, findings reveal that regular reminders about hand hygiene are helpful to Batswana University students in preventing influenza. The implication is that they value ongoing health campaigns to sustain good hygiene practices. These results support [10], who pointed out that intense media campaigns during H1N1 influenza successfully educated Korean students, as evidenced by positive attitude and practice of hand hygiene. Importantly, the results demonstrated that while social influence/peer behaviour do play a role in students' hand hygiene habits, their impact may be less than that of their internal drive. This indicates that the students do not rely exclusively on others' actions to prompt their own hygiene practices. Such findings augment the views by [1] who showed that seeing others perform preventive behaviours during pandemic can encourage an individual to do the same due to the desire to conform to healthy behaviours. This study holds that, while students are influenced by others to some degree, they are also prepared to act autonomously and even influence others,

adding a fresh perspective to the understanding of hand hygiene attitudes.

Theoretically, this research contributes to health belief model which highlights that individuals adopt health behaviours when they perceive high susceptibility and severity of disease [34]. The high mean scores for the perceived importance of hand hygiene, personal and collective responsibility suggest strong perceived severity and benefits which support the predictive capacity of the HBM in the Botswana university context. Overall, this study reinforces existing literature by confirming that positive attitudes are crucial and today's students not only believe in hand hygiene at personal level but also view it as a collective responsibility.

### **Knowledge and Behaviours of Botswana University Students associated with Hand Hygiene for Preventing Influenza Infections**

The quantitative findings above depict comparatively mixed hand-hygiene knowledge and self-reported compliance among Botswana university students. High frequencies of handwashing after touching public/shared surfaces and dominance of soap-and-water use are broadly consistent with post-pandemic studies in university settings, which report improved awareness and practice of hand hygiene for respiratory infection control [30]. However, failure to practice hand hygiene regularly and washing hands for only ten seconds depict knowledge gaps. Previous KAP studies identified substantial gaps between knowledge and behaviour as the students acknowledged the importance of handwashing but failed to wash hands consistently after high-risk contacts. However, the present results suggest that this knowledge–practice gap could be narrowing in this context.

The use of both soap and sanitiser and some uptake of hand sanitisers and antibacterial wipes indicates diversified prevention strategies. Previous studies have focused on

either soap-and-water or sanitiser access, particularly in low- and middle-income settings, by highlighting infrastructural constraints as barriers to practice [35]. The current pattern suggests more resourceful and multi-modal approach to influenza prevention. However, significant proportion of respondents' report washing hands for 10 seconds with only 25% washing hands for the recommended 20 seconds. Existing research show that even when students wash hands, duration is typically shorter than WHO recommendation of at least 20 seconds [12]. Accordingly, low adherence to the 20-second rule is therefore discouraging which highlights the need for educational campaigns to boost knowledge awareness.

From the data analysis, a high level of hand-hygiene knowledge and self-reported adherence among Botswana university students is evident. However, existing literatures on university populations show adequate knowledge but inconsistent practice. According to [36], Bangladeshi university students understood the importance of handwashing yet regular compliance after key coughing or sneezing was limited. From the findings, hand hygiene is important even when hands are not visibly which highlights conceptual understanding that microbes are invisible. This affirms the position by [3] who showed that university students often have good awareness of such principles but this does not always translate into consistent behaviour. These findings reinforce the growing evidence that university populations can achieve a high level of cognitive alignment with WHO guidance.

More importantly, alcohol-based sanitiser is recognised as a valid substitute when soap and water are unavailable, a common situation in resource-constrained African settings where access to water is a challenge. Prior African studies by [35] among Tanzanian students and nurses have emphasised structural barriers to handwashing, with less attention to substitution strategies. In contrast, this research suggests

that students not only accept sanitiser use but also understand its situational role, thus contributing new insight into adaptive hygiene behaviours under infrastructural constraints. However, the finding that sanitisers should contain at least 60% alcohol reveals specific technical knowledge deficit. This consistent with evidence that while students know that sanitiser works, they rarely appreciate formulation thresholds despite clear CDC guidance that more than 60% alcohol is required for optimal effectiveness [37]. The divergence between strong behavioural norms and weaker product-specific literacy is a key nuance that many earlier KAP studies have not explored. Overall, this research holds that Batswana university students have mixed level of hand-hygiene knowledge and self-reported adherence with regard to influenza prevention.

### **Effectiveness of Hand Hygiene Practices Adopted for Preventing Influenza Transmissions among Batswana University Students**

Analysis of quantitative findings above indicate that Batswana university students strongly endorse behavioural interventions such as handwashing, crowd avoidance and social distancing as key practices for reducing influenza infection while showing relatively low confidence in face masks and vaccination. This pattern partly aligns with literatures in low-middle income countries and student populations where handwashing is perceived as the most familiar and low-cost protection, whereas vaccine uptake and mask use are constrained by scepticism, access and risk communication among African and Asian university students [38]. Compared with studies that report modest perceived effectiveness of hand hygiene and a stronger emphasis on vaccination in high-income settings [6], these results reverse this priority hierarchy and highlight a context in which everyday hygiene practices are more trusted than biomedical barrier methods.

Additionally, research findings showed high proportion of participants who perceive reduced symptoms (87%) and absence of diagnosis (82%) after practising hand hygiene. Previous research on influenza or respiratory-virus prevention rarely captures this kind of self-attributed causal link. Most research studies by [30] and [39] focuses on KAP scores or laboratory and epidemiological endpoints rather than perceived health outcomes. Therefore, the current findings contribute novel subjective dimension where students attribute tangible health benefits to their behaviours. Further, the preference for soap and water over alcohol-based sanitiser is consistent with some African studies in which water-based hygiene is culturally normative and sanitisers are seen as costly [35]. However, the relatively small proportion favouring combined approach contrasts with post-COVID guidance that emphasises complementary use of both depending on contexts [5]. The identification of forgetfulness, facility access, cost and lack of awareness as key barriers echoes established structural and behavioural constraints [39], but packaged within university setting in Botswana where empirical evidence has been limited. This enhances contextual understanding of why high knowledge does not always translate into optimal and consistent practice. Future researchers should triangulate self-reports with clinical or surveillance data on influenza incidence, use qualitative methods to unpack vaccine and mask hesitancy or model the combined effect of non-pharmaceutical interventions and vaccination on influenza burden in university environments.

### **Conclusion**

The current research presents significant insights into hand hygiene knowledge, attitudes, behaviours and practices of university students towards preventing influenza infection. The study demonstrates that Batswana university students hold strong positive attitudes, mixed levels of knowledge

and broad compliant behaviours regarding hand hygiene for influenza prevention. The narrowing knowledge–practice gap and resourceful use of soap, water, sanitisers and wipes indicate effective internalisation of technical guidance, while low adherence to the 20-second handwashing rule underscores the need for health educational campaigns. At the same time, reliance on self-reports, lower confidence in biomedical interventions and persistent structural barriers (costs, facilities, forgetfulness) signal ongoing vulnerabilities. Future research should incorporate objective behavioural or clinical measures, qualitative exploration of vaccine and mask hesitancy, and intervention trials that integrate behavioural practices with improved infrastructural support to ensure effective influenza prevention.

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### References

- [1]. Hong, Q., & Xu, Y., 2024, Evaluating hand hygiene knowledge, attitudes, and practices among healthcare workers in post-pandemic H1N1 influenza control: a cross-sectional study from China. *Frontiers in Public Health*, 12, 1432445. <https://doi.org/10.3389/fpubh.2024.1432445>
- [2]. Yang, X., Tang, W., Tan, Q., Mao, D., & Ding, X., 2022, The vaccine hesitancy profiles and determinants of seasonal influenza among Chinese community healthcare workers: a cross-sectional study. *Vaccine*, 10, 1547. Doi: 10.3390/vaccines10091547
- [3]. Akan, H., Gurol, Y., Izbirak, G., Ozdathl, S., Yilmaz, G., Vitrinel, A., & Hayran, O., 2010, Knowledge and attitudes of university students toward pandemic influenza: a cross-sectional study from Turkey. *BMC Public health*, 10(1), 413.

study. Similarly, I appreciate myself and all participants for their individual contributions to the study.

### Ethical Approval

The research was approved by the University of Gaborone Ethics Committee before data collection

### Conflict of Interest

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

### Data Availability

The datasets generated and/or analysed during the current study are available from the corresponding author upon reasonable request.

### Author Contribution

The author was responsible for the study design, data collection, data analysis, and research paper preparation.

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This research received no external funding.

- [4]. Seloilwe, E. S., Kealeboga, K. M., & Khutjwe, J. V., 2023, A coordinated health policy in response to COVID-19: A case of Botswana. *Journal of nursing scholarship: an official publication of Sigma Theta Tau International Honour Society of Nursing*, 55(1), 163–166. <https://doi.org/10.1111/jnu.12821>
- [5]. Gozdzielewska, L., Kilpatrick, C., Reilly, J., Stewart S., Butcher, J., & Price, L., 2022, The effectiveness of hand hygiene interventions for preventing community transmission or acquisition of novel coronavirus or influenza infections: a systematic review. *BMC Public Health*, 22, 1283. <https://doi.org/10.1186/s12889-022-13667-y>
- [6]. Vogel, O. A., & Manicassamy, B., 2020, Broadly protective strategies against influenza viruses: universal vaccines and therapeutics. *Frontiers Microbiology*, 11, 517828. doi: 10.3389/fmicb.2020.00135

- [7]. Fulchini, R., Kohler, P., Kahlert, C. R., Albrich, W. C., Kuhn, R., Hoffmann, M., & Schlegel, M., 2018, Hand hygiene adherence in relation to influenza season during 6 consecutive years. *American journal of infection control*, 46(11), 1311-1317. doi: 10.1016/j.ajic.2018.04.203
- [8]. Neo, J. R. J., Sagha-Zadeh, R., Vielemeyer, O., & Franklin, E., 2016, Evidence-based practices to increase hand hygiene compliance in health care facilities: An integrated review. *American Journal of Infection Control*, 44(6), 691-704.
- [9]. Jo, S., Han, S. Y., & Howe, N., 2023, Factors associated with handwashing behaviours during the COVID-19 pandemic: an analysis of the community health survey in Korea. *SAGE open nursing*. 9, 23779608231172364. Doi: 10.1177/23779608231172364
- [10]. Park, J. H., Cheong, H. K., Son, D. Y., Kim, S. U., & Ha, C. M., 2010, Perceptions and behaviours related to hand hygiene for the prevention of H1N1 influenza transmission among Korean university students during the peak pandemic period. *BMC infectious diseases*, 10, 222. <https://doi.org/10.1186/1471-2334-10-222>
- [11]. Aiello, A. E., Murray, G. F., Perez, V., Coulborn, R. M., Davis, B. M., Uddin, M., & Monto, A. S., 2010, Mask use, hand hygiene, and seasonal influenza-like illness among young adults: a randomized intervention trial. *The Journal of infectious diseases*, 201(4), 491-498. doi: 10.1086/650396.
- [12]. Moncion, K., Young, K., Tunis, M., Rempel, S., Stirling, R., & Zhao, L., 2019, Effectiveness of hand hygiene practices in preventing influenza virus infection in the community setting: A systematic review. *Canada communicable disease report*, 45(1), 12-23. <https://doi.org/10.14745/ccdr.v45i01a02>
- [13]. Patient Info, 2024, *Botswana: Travel health advice, vaccines and risks*. Retrieved from <https://patient.info/travel-and-vaccinations/botswana>
- [14]. Xinhua, 2024, *Botswana reports increase in cases of influenza-like illness, COVID-19*. Retrieved from <https://english.news.cn/africa/20240222/97fedec7a1594472a5a33b327de782f7/c.html>
- [15]. Suess, T., Renschmidt, C., Schink, S. B., Schweiger, B., Nitsche, A., Schroeder, K., & Buchholz, U., 2012, The role of facemasks and hand hygiene in the prevention of influenza transmission in households: results from a cluster randomised trial; Berlin, Germany, 2009-2011. *BMC infectious diseases*, 12(1), 26. <https://doi.org/10.1186/1471-2334-12-26>
- [16]. Bruce, N., Pope, D., & Stanistreet, D., 2018, Quantitative methods for health research: a practical interactive guide to epidemiology and statistics. *John Wiley & Sons*.
- [17]. Renjith, V., Yesodharan, R., Noronha, J. A., Ladd, E., & George, A., 2021, Qualitative methods in health care research. *International journal of preventive medicine*, 12(1), 20.
- [18]. Hunziker, S., & Blankenagel, M., 2024, Cross-sectional research design. In *Research design in business and management: A practical guide for students and researchers* (pp. 187-199). *Wiesbaden: Springer Fachmedien Wiesbaden*.
- [19]. Spector, P. E., 2019, Do not cross me: Optimizing the use of cross-sectional designs. *Journal of business and psychology*, 34(2), 125-137.
- [20]. University of Botswana. 2025, *Annual Report 2023/24*. Retrieved from <https://www.ub.bw/sites/default/files/2025-04/UB-Annual-Report-202324-17042025.pdf>
- [21]. Golzar, J., Noor, S. & Tajik, O., 2022, Convenience sampling. *International Journal of Education & Language Studies*, 1(2), 72-77.
- [22]. Etikan, I., Musa, S. A., & Alkassim, R. S., 2016, Comparison of convenience sampling and purposive sampling. *American journal of theoretical and applied statistics*, 5(1), 1-4.
- [23]. Saunders, M. N. K., Lewis, P., & Thornhill, A., 2019, *Research methods for Business students*. 8th edition. *Harlow: Pearson*
- [24]. Saris, W. E., & Gallhofer, I. N., 2014, Design, evaluation, and analysis of questionnaires for survey research. *John Wiley & Sons*.
- [25]. Bulanov, N. M., Suvorov, A. Y., Blyuss, O. B., Munblit, D. B., Butnaru, D. V., Nadinskaia, M. Y.,

- & Zaikin, A. A., 2021, Basic principles of descriptive statistics in medical research. *Сеченовский вестник*, 12(3), 4-16.
- [26]. Hazra, A., 2023, Descriptive and inferential statistics in biomedical sciences: An overview. *The quintessence of basic and clinical research and scientific publishing*, 461-478.
- [27]. Keeler, C., & Curtis, A.C., 2024, Descriptive and Inferential Statistics in Nursing Research. *AJN The American Journal of Nursing*, 124(1), 48-52.
- [28]. Drolet, M. J., Rose-Derouin, E., Leblanc, J. C., Ruest, M., & Williams-Jones, B. 2023, Ethical issues in research: Perceptions of researchers, research ethics board members and research ethics experts. *Journal of Academic Ethics*, 21(2), 269-292.
- [29]. Adeyinka, T., & Mutula, S. M., 2008, Gender differences in computer literacy among undergraduate students at the University of Botswana: Implications for library use. *Malaysian Journal of Library and Information Science*, 13(1), 59-76.
- [30]. Mohamed, Y. S., Spaska, A., Andrade, G., Baraka, M. A., Ahmad, H., Steele, S., . & Panigrahi, D., 2024, Hand hygiene knowledge, attitude, and practice before, during and post COVID-19: a cross-sectional study among university students in the United Arab Emirates. *Infection Prevention in Practice*, 6(2), 100361. DOI: 10.1016/j.infpip.2024.100361
- [31]. Bernard, L., Biron, A., Lavigne, G., Frechette, J., Bernard, A., Mitchell, J., & Lavoie-Tremblay, M., 2018, An exploratory study of safety culture, biological risk management and hand hygiene of healthcare professionals. *Journal of advanced nursing*, 74(4), 827-837.
- [32]. Dlalisa, S., Jama, S., Duma, N., Mnguni, G., & Pillay, T., 2025, Exploring the knowledge, attitudes and practices of students at Mangosuthu University of Technology on hand hygiene. *Student's Journal of Health Research Africa*, 6(10), 1. <https://doi.org/10.51168/sjhrafrica.v6i10.2127>
- [33]. Fudolig, M. A., Davis, R. E., Batra, K., & Sharma, M., 2025, Profile Analysis of Handwashing Behavior Among a Sample of College Students in the Multi-Theory Model Framework. *Hygiene*, 5(1), 7. <https://doi.org/10.3390/hygiene5010007>
- [34]. Green, E. C., Murphy, E. M., & Gryboski, K., 2020, The health belief model. *The Wiley encyclopedia of health psychology*, 211-214.
- [35]. Silago, V., Manzi, M. J., Mtemisika, C. I., Damiano, P., Mirambo, M. M., & Mushi, M. F., 2022, Knowledge, attitude and practices of hand hygiene among students and nurses staff in Mwanza Tanzania: a cross-sectional hospital-based study during global COVID-19 pandemic. *East Africa Science*, 4(1), 11-20.
- [36]. Sultana, M., Mahumud, R. A., Sarker, A. R., & Hossain, S. M., 2016, Hand hygiene knowledge and practice among university students: evidence from private universities of Bangladesh. *Risk management and healthcare policy*, 13-20.
- [37]. CDC, 2024, *Hand Sanitizer Facts*. Retrieved from [https://www.cdc.gov/clean-hands/data-research/facts-stats/hand-sanitizer-facts.html?utm\\_source=chatgpt.com](https://www.cdc.gov/clean-hands/data-research/facts-stats/hand-sanitizer-facts.html?utm_source=chatgpt.com)
- [38]. Ahmed, J., & Ali, D., 2019, Assessment of knowledge, attitude and practices regarding H1N1 pandemic influenza among the health care providers working at a tertiary care hospital in Kashmir: a cross sectional study. *International Journal of Advanced Community Medicine*, 2(2), 23-27. DOI: <https://doi.org/10.33545/comed.2019.v2.i2a.05>
- [39]. Wong, V. W. Y., Cowling, B. J., & Aiello, A. E., 2014, Hand hygiene and risk of influenza virus infections in the community: a systematic review and meta-analysis. *Epidemiology and Infection*, 142(5), 922-932. doi:10.1017/S095026881400003X