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Alcohol-based hand sanitizer use among university students in Bangladesh: knowledge, practices, and influencing factors

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ABSTRACT

Since the outbreak of the novel coronavirus epidemic in December 2019, it has become a significant threat to the health and lives of the global population. In 2020, the World Health Organization (WHO) approved alcohol-based hand sanitizer (ABHS) as an alternative hand hygiene method to prevent the spread of coronavirus infection. As a result, during the COVID-19 epidemic, the use of alcohol-based hand sanitizers expanded rapidly, particularly among students. In Bangladesh, there has been a substantial growth of ABHS producers since the outbreak of coronavirus. Greater emphasis was placed on the necessity to use ABHS for protection but but placed less emphasis on safe use. This research attempts to assess the knowledge, practices, and influencing factors related to ABHS usage among university students in Dhaka, Bangladesh. A cross-sectional online survey was carried out among 800 university students using a semi-structured questionnaire. More than half of the students buy alcohol-based hand sanitizer due to their effectiveness. The multiple regression analysis suggests that age, sex, and family income sources have affected students' knowledge and practice scores associated with alcohol-based hand sanitizers. This study highlights the need for proper ABHS usage, handling, and selection for maximum efficacy against targeted infections and safe ABHS use. Only adequate awareness and knowledge on hand hygiene practices can reduce the risks of pathogen transmission, either directly or indirectly.

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1. INTRODUCTION

Increased occurrences of infectious diseases are highly linked with the lack of compliance, especially regarding hand hygiene. Hand hygiene is considered a very effective mitigation measure, and it can be achieved through several methods, including washing with soap and water, using alcohol-based hand sanitizers (ABHS), and surgical washing [1], [2]. Since the global outbreak of coronavirus (SARS-CoV-2) in 2019, the use of ABHS has surged worldwide among the public in pursuit of preventing the spread of COVID-19 disease [3]. Lack of hand hygiene allows surface-to-surface direct and indirect transmission pathways for coronavirus. Though strong mitigation measures like lockdowns, social distancing, and suspension of risky activities are recommended, but these were not practical and politically viable given the

high population density and socio-economic features in Bangladesh [4]. Disinfecting hands frequently with >60% alcoholic sanitizers are the most effective and vital preventive measures against the coronavirus [5]. At this outset, hand hygiene is extensively promoted by the World Health Organization (WHO) by adopting a protocol outlining the appropriate use of sanitizers [6]. Two distinctive forms–rinses and rubs-of ABHS exist, and they contain isopropyl alcohol, ethanol, and/or other ingredients in different proportions. Inevitably, the burgeoning demand for sanitizers worldwide, including in Bangladesh during the COVID-19 outbreak, has resulted in trade spikes to minimize shortages of such products [7]. Many producers have quickly stepped in to produce hand sanitizers since the demand will stay high for an extended period. In Bangladesh, nearly fifty companies started producing sanitizers since the outbreak of coronavirus and majority of which entered this market for the first time [8]. Recent research nevertheless suggests that most of the hand sanitizers in the Bangladeshi market do not follow the standard formulation procedure, and some are contaminated with methanol, which can amplify the risks of health hazards [9]. Studies in many other low and middle-income countries have also highlighted the dramatic rise in hand sanitizers use since the COVID-19 pandemic hit the world. In Nigeria, use of such local products have increased among the university students, mainly driven by public health awareness campaigns [10]. Similar trends have also been observed in India where targeted public health initiatives have significantly contributed to the rise of sanitizers use among students [11]. Immunization, maintaining safety and infectious disease control measures largely depends on knowledge, belief, and practices regarding personal hygiene [12]. However, there is a paucity of studies regarding the hand hygiene issues associated with sanitizers use among the university students in Bangladesh. This group of population, particularly from cities, are exposed to a plethora of information sources, making them vulnerable to misinformation. Therefore, our study makes an attempt to analyze the knowledge, practices, and influencing factors associated with ABHS use among the university students in Dhaka city.

Health issues associated with commercialized ABHS at the consumer level may arise from their flammability, accidental or deliberate ingestion, and dermatological conditions [13]. Due to the lack of adequate information, decision-making regarding the use of hand sanitizer remains under the discretion of an individual [14]. Empirical evidence suggests that poor access to handwashing facilities in Dhaka city lets people quickly adopt AHBS-based hygiene practices [15]. University students in Dhaka are more inclined to use hand sanitizers due to cost, convenience, and suboptimal hand-washing facilities [16]. Therefore, users' awareness and knowledge regarding the identification of safe ABHS and its appropriate use is pertinent to mitigating health hazards like allergies, dry skin, lung injury, toxicities, and fire incidents despite their effectiveness as a preventive measure [17]. As part of business strategies, manufacturers incorporate ingredients like emollients, viscosity enhancers, and fragrances in ABHS, which reportedly reduce the efficacy of hand sanitizers and can trigger more threatening health impacts [18]. It is worth mentioning that hand sanitizers are only effective when manufactured using correct formulas and applied correctly [9]. Recent research has shed light on how human exposure to ABHS has increased due to widespread misinformation on social media, impelling the non-evidence-based application of sanitizers in the developing world [19]. Many alcohol exposure cases related to using hand sanitizers in the US were unintentional and attributed to the intensifying COVID-19 situation since March 2020 [20]. Another study based in the US indicated that the number of people who have confronted the adverse health challenges associated with exposure to hand sanitizers has doubled in the last two years [21]. A cross-sectional study in Bangladesh reports that frequent use of hand sanitizers caused substantially more severe skin problems among health workers than non-healthcare workers (NHCWs) since NHCWs relied more on soap-based handwashing [22]. Though a plethora of research indicates the health impacts associated with ABHS use, there is a limited understanding of how the overall knowledge of consumers, including students in low-income settings like Bangladesh, shapes the use of such products [15], [23]. A study shows students in China with greater health-safety knowledge and perception are tend to follow guidelines to prevent themselves from COVID-19 [24]. Therefore, assessing the student's assessing the knowledge, practices, and influencing factors related to ABHS usage among university students in Dhaka, Bangladesh, is a significant public health agenda and the key objective of this research. The findings from this research will strategically contribute to the design and development of public health interventions for university students in promoting safe and effective hand hygiene practices.

2. METHOD

This cross-sectional quantitative study was conducted in Dhaka, Bangladesh, for four months through an electronic questionnaire survey among university students who were at the undergraduate level. The pre-tested, semi-structured, self-administered questionnaire was divided into four sections: demographic and background information, hand-hygiene information, surroundings information, and self-knowledge information. The demographic and background information sections were based on standard categories, which are multiple choices; the same goes for the self-hygiene information section, while self-knowledge information is based on checkboxes

and yes/no types. To test the validity of the content of the instrument, public health and behavioral research experts were consulted to review the questionnaire and provide feedback. A pilot test was done with 30 students to ensure construct validity. Feedback from the review and pilot test were accordingly addressed. Reliability of the questionnaire was assessed by measuring Cronbach's alpha which was 0.82, indicating a high level of reliability. University students from Dhaka, Bangladesh, were chosen as the respondents for this research. To ensure a representative sample, a stratified random sampling technique was employed. A total of 800 students answered the questionnaire to acquire more information about their practice and knowledge of hand sanitizer use. This sample size was calculated while keeping a 95% confidence level and 5% margin of error. This is common in Social Science research when the population size exceeds 10,000. The survey's links were distributed using social networking applications, WhatsApp, Messenger, Google Classroom, and Gmail to maximize reach from the 26th of March 2022 until the 26th of June 2023. A prior consent form was shared at the beginning of the survey, and participants were assured of their anonymity and confidentiality throughout the study. The study was designed and performed following the research guidelines set forth by Independent University, Bangladesh. Ethical approval was approved by the IRB of IUB. In addition, all respondents were provided with the detail information on the purpose of the study prior to their participation in the survey. Their informed consent was also recorded. It is noteworthy to mention that they survey was anonymous, and the privacy and confidentiality of the respondents were ensured. All the collected data were analyzed using R Software.

Several strategies were undertaken to establish control for confounding variables. First, through stratified sampling participants were selected from a wide range of background. Multiple regression analysis was conducted to correlate demographic factors with knowledge and practice. Additionaly, multicollinearity tests were performed for stronger correlations with all variance inflation factor (VIF) values below 5. To summarize the data, descriptive statistics were used in terms of mean, standard deviation, percentage, and frequencies with a 95% confidence interval. In addition, correlation analysis and multiple regression analysis were also performed. The knowledge score was calculated first. In multiple regression analysis, knowledge and practice scores were treated as dependent variables and sex, age, current major, marital status, religion, place of residence, number of family members, income source and smoking behavior as predictors. To validate the regression models, tests for multicollinearity, normality, and homoscedasticity were undertaken. The VIF values for all predictors were below 5, indicating no significant multicollinearity. This ensured the reliability of the regression coefficients. Ethical approval for this study was taken from the Institutional Review Board of Independent University, Bangladesh.

3. RESULTS

In this study, 800 students answered the questionnaire to get more information about their practice and knowledge of hand sanitizer use. The students' socio-demographic characteristics and the questionnaire analysis are in Table 1. The majority of students were male, Muslim, and lived in urban areas, with statistically significant differences across these demographic categories. Detailed breakdowns of gender, religious status, and place of residence, along with p-values, can be found in Table 1. Concerning religious status, most of the students are Muslim (92.50%), with statistically significant differences between all levels ($p<0.0001$). In terms of the place of residence of the students, most of them were living in the urban area (89.38%), with a statistically significant difference between the levels ($p<0.0001$). Based on the number of family members in the household, the majority of the student's family members were 4-6 (71.88%), with statistically significant differences between the levels ($p<0.0001$). The 635 (79.38%) of the students were smokers, with statistically significant differences between the levels ($p<0.0001$). Concerning the academic majors, 248 (31%) of the students were business studies majors, 198 (24.75%) of the students were IT and engineering majors, 184 (23%) of the students were sciences majors, 89 (11.13%) of the students were social science major, 65 (8.13%) of the students were health and biological sciences major, 10 (1.25%) of the students were Arts and humanities major and the rest 6 (0.07%) students were another major, with statistically significant differences between all the levels ($p<0.0001$). Among the respondents, 380 (47.50%) of them have their primary source of family income as self-employed, 374 (46.75%) the primary source of family income was a private job, and the rest, 46 (5.75%) had a primary source of family income was a government job, with statistically significant differences between all levels ($p<0.0001$). The hand hygiene knowledge of the students was assessed by 13 items, which are provided in Table 2.

In the multiple regression presented in Table 3, we considered the dependent variable as the knowledge score of hand hygiene during COVID-19 and the predictors as sex, age, current major, marital status, religion, place of residence, number of family members, income source and smoking behavior. The following results show that the correlation coefficient ($R = 0.228$ with p-value = 0.000003) indicates a weak positive relationship between the knowledge of hand hygiene and the factors affecting the knowledge score. This value indicates that there is some degree of association between these variables, but it's not particularly strong. The p-value associated with the correlation coefficient is extremely small (0.000003), indicating that the

observed correlation is statistically significant. This means that it's highly unlikely to observe such a strong correlation between the knowledge of hand hygiene and the influencing factors by random chance alone. Based on the multiple regression analysis results, the adjusted R-squared value of 0.042 indicates that approximately 4.2% of the variance in the knowledge score of hand hygiene during COVID-19 is explained by the predictors included in the model. This value suggests that the model as it stands might not be particularly strong in explaining the variability in the dependent variable. Even though the adjusted R-squared is relatively low, it's noted that the overall model is statistically significant. This means that the combined effect of all the predictors in the model is significant in explaining the variation in the knowledge score. Among the predictors, we can see that factors that affected the knowledge score of hand hygiene were sex, age, current major, and primary source of family income. On the other hand, the variables such as marital status, religion, place of residence, number of family members, and smoking behavior do not appear to have a statistically significant effect on the Knowledge score of hand hygiene during COVID-19. Multicollinearity was verified using the variance inflation factor. All the values of the VIF are less than 5. The analysis confirms there is no multicollinearity among the predictors, which is essential for the reliability of the regression coefficients. In summary, while the adjusted R-squared value may be small, our study results still provide valuable insights and lay the foundation for further research and practical applications in addressing knowledge levels of hand hygiene during COVID-19.

Table 4 presents the results of the multiple regression analysis, with the practice score of hand hygiene during COVID-19 as the dependent variable and predictors including sex, age, current major, marital status, religion, place of residence, number of family members, income source, and smoking behavior. The analysis reveals a weak relationship between the practice score and the predictors, with a correlation coefficient (R) of 0.202 and a significant p-value of 0.000136. The adjusted R-squared value of 0.030 suggests that approximately 3.0% of the variability in the Practice score can be explained by the predictors included in the model. This indicates a relatively low level of explanatory power. Upon further examination, it's found that only sex, current major, and income source significantly affect the Practice score, as indicated by their statistically significant p-values. Conversely, predictors such as age, marital status, religion, place of residence, number of family members, and smoking behavior are found to be not statistically significant, as their p-values exceed 0.05. Also, the examination for multicollinearity using the variance VIF reveals that all VIF values are below 5, indicating no multicollinearity among the predictors. Overall, despite the relatively low explanatory power of the model, the study result offers important insights into the factors shaping hand hygiene practices during COVID-19, highlighting the significance of gender, academic focus, and income source in particular.

Table 1. Socio-demographic characteristics of the respondents

Issues	Count	Response percent	p-value
Gender			
Male	413	51.63%	<0.0001
Female	387	48.38%	68
Age			
18-22	523	65.38%	<0.0001
23-27	250	31.25%	
>27	27	3.38%	
Marital status			
Single	749	93.63%	<0.0001
Married	48	6%	
Divorced	3	0.04%	
Widowed	0	0%	
Religion			
Muslim	740	92.50%	<0.0001
Hindu	47	5.88%	
Christian	11	1.38%	
Buddhist	2	0.03%	
Place of residence			
Urban	715	89.38%	<0.0001
Rural	85	10.63%	
No. of family members			
Less than 4 members	166	20.75%	<0.0001
4-6 members	575	71.88%	
7-8 members	35	4.38%	
More than 8 members	24	3%	
Family income source			
Self employed	380	47.50%	<0.0001
Government job	46	5.75%	
Private job	374	46.75%	
Smoking behavior			
Smoker	635	79.38%	<0.0001
Non-smoker	165	20.63%	

Table 2. Knowledge of hand hygiene

Questions	Responses	Response/count (%)
When is it appropriate to use hand sanitizer? Before, during, and after preparing food	Yes/1	402 (50.25%)
Female	No/0	398 (49.75%)
When is it appropriate to use hand sanitizer? Before and after eating food	Yes/1	463 (57.88%)
18-22	No/0	337 (42.13%)
When is it appropriate to use hand sanitizer? After using toilet	Yes/1	424 (56%)
>27	No/0	376 (47%)
When is it appropriate to use hand sanitizer? After touching animals	Yes/1	495 (61.88%)
Single	No/0	302 (37.75%)
When is it appropriate to use hand sanitizer? If your hands are visibly dirty or greasy	Yes/1	424 (53%)
Divorced	No/0	376 (47%)
When is it appropriate to use hand sanitizer? Before and after visiting a hospital/nursing home	Yes/1	596 (74.5%)
Religion	No/0	204 (25.5%)
When is it appropriate to use hand sanitizer? If soap water is not available	Yes/1	474 (59.25%)
Hindu	No/0	326 (40.75%)
When is it appropriate to use hand sanitizer? Others, specify	Yes/1	24 (3%)
Buddhist	No/0	776 (97%)
Good sanitizers contain	Zero alcohol	280 (35%)
Urban	At least 30% alcohol	347 (43.38%)
Rural	At least 60% alcohol	117 (14.63%)
No. of Family Members	At least 90% alcohol	56 (7%)
Is it necessary to wash hands after using hand sanitizer?	Yes/1	173 (21.63%)
4-6 Members	No/0	627 (78.38%)
You should put enough sanitizer on your hands to cover all surfaces	Yes/1	692 (86.5%)
More than 8 Members	No/0	108 (13.5%)
You should rub your hands together until they feel dry	Yes/1	691 (83.38%)
Self Employed	No/0	109 (13.63%)
Alcohol-based hand sanitizers can quickly reduce the number of microbes on the hands in some situations, but sanitizers do not eliminate all types of germs	Yes/1	638 (79.75%)
Private job	No/0	162 (20.25%)
Swallowing alcohol-based hand sanitizers can cause alcohol poisoning	Yes/1	544 (68%)
Smoker	No/0	256 (32%)
Hand Sanitizer should be used in a well-ventilated area	Yes/1	472 (59%)
	No/0	328 (41%)
Hand sanitizers can contain toxic alcohol	Yes	176 (22%)
	No	88 (11%)
	I don't think so	536 (67%)
Excessive use of hand sanitizer can cause	Rash on skin/red skin	95 (11.85%)
	Abrasion and fissures	3 (0.04%)
	Dryness of skin	104 (13%)
	Extreme itching, burning, or soreness	32 (4%)
	Hand sanitizers are safe	159 (19.88%)
	Others	407 (50.88%)
Do you think hand sanitizer is more effective than normal soap?	Yes/1	417 (52.13%)
	No/0	383 (47.88%)
Frequent usage of hand sanitizers has reported an increased chance of antimicrobial resistance and chance of other viral diseases	Yes/1	374 (46.75%)
	No/0	426 (53.25%)
Do you think that hand sanitizers can pose health risks?	Yes/1	286 (35.75%)
	No/0	514 (64.25%)

Table 3. Multiple regression of factors with knowledge score of hand hygiene during COVID 19

Model	R	Adj R square	F	Sig.	Coeff.	Std. error	t	Sig.	95% CI for the coeff.	VIF
(Constant)					18.65	0.975	19.12	<2e-16	(16.74, 20.57)	
Sex					1.06	0.291	3.64	0.0003	(0.49, 1.63)	1.33
Age (in years)					-0.52	0.243	-2.13	0.0338	(-0.99, -0.04)	1.12
Current major					-0.25	0.072	-3.39	0.0007	(-0.39, -0.10)	1.07
Marital status					-0.60	0.495	-1.22	0.2249	(-1.57, 0.37)	1.08
Religion	0.228	0.041	4.79	0.000003	-0.29	0.360	-0.80	0.4261	(-0.99, 0.42)	1.04
Place of residence					0.26	0.420	0.61	0.5443	(-0.57, 1.08)	1.06
Number of family members					-0.01	0.214	-0.06	0.9539	(-0.43, 0.41)	1.04
Income source					0.32	0.133	2.43	0.0155	(0.06, 0.58)	1.05
Smoking behavior					0.56	0.351	1.58	0.1142	(-0.13, 1.25)	1.25

Table 4. Multiple regression of factors with practice score of hand hygiene during COVID 19

Model	R	Adj R square	F	Sig.	Coeff.	Std. error	t	Sig.	95% CI for the coeff.	VIF
(Constant)					11.61	0.775	14.97	<2e-16	(10.09, 13.13)	
Sex					0.87	0.232	3.74	0.0002	(0.41, 1.32)	1.33
Age (in years)					0.12	0.193	0.62	0.5332	(-0.26, -0.50)	1.12
Current major					0.20	0.058	3.44	0.0006	(0.09, 0.31)	1.07
Marital status					-0.22	0.394	-0.56	0.5786	(-0.57, 0.37)	1.08
Religion	0.202	0.030	3.72	0.000136	-0.48	0.287	-1.68	0.0942	(-0.99, 0.56)	1.04
Place of residence					-0.26	0.335	-0.77	0.4424	(-1.04, 0.08)	1.06
Number of family members					0.11	0.171	0.67	0.5052	(-0.22, 0.45)	1.04
Income source					0.29	0.106	2.72	0.0066	(0.08, 0.50)	1.05
Smoking behavior					0.13	0.278	0.478	0.6324	(-0.41, 0.68)	1.25

4. DISCUSSION

The study highlights the significant disparities in the knowledge and practice of ABHS among university students in Dhaka, Bangladesh. It reveals that the overall knowledge regarding the efficacy of ABHS is relatively high. However, critical gaps remain in the domains associated with the understanding of safe and effective use of these products. Hence, we aim to delve deeper into the findings in this Discussion section by contextualizing them within the literature and recommend practical interventions. As mentioned earlier, majority of the students have a relatively strong idea about the efficacy of ABHS in preventing the spread of infectious agents, some misconceptions prevail regarding the safe use of ABHS. It is noteworthy to mention that some students are not aware of the potential risks and threats associated with the improper use and handling of ABHS. For instance, they could not identify the risks of methanol poisoning and the need for following the WHO or CDC standard protocol. These findings align with the global concerns of the World Health Organization regarding the widespread growth and use of substandard sanitizers, especially in the developing countries since the beginning of the COVID-19 pandemic [24]. COVID-19 disease has created unprecedented challenges worldwide over the last few years [25]. Leading scientific organizations, including the World Health Organization and the Centers for Disease Control and Prevention, have adopted health and safety protocols by incorporating preventive measures for COVID-19 disease [26]. Similar misconceptions were also highlighted in the research by Alwan *et al.* [27] reiterating the need for more public education initiatives on the safety issues associated with the use and handling of ABHS. Since inappropriate use of hand sanitizers poses significant health risks, the present study attempted to explore the knowledge and practice of hand sanitizer use among university students in Dhaka, Bangladesh. Significant predictors of knowledge and practice scores are sex, age, current major, and family income sources, identified in the multiple regression analysis. The results of our study are found to be consistent with some other studies conducted in the middle-income and lower middle-income countries. In those studies, it has been seen that the correlation between socio-demographic factors and health knowledge and behavior are statistically significant. For instance, one of the studies found that younger female students and older students tend to have a higher level of knowledge as well as practices related to the use of ABHS to prevent the spread of coronavirus [28]. In contrast to our findings, various behavioral theories such as Health Belief Model suggests that only knowledge cannot drive a behavioral change [29]. Perception of individuals regarding susceptibility, severity and cues to actions is also critical to drive behavioral changes associated with hygiene.

More than half of the respondents use hand sanitizers while staying outdoors when suboptimal handwashing facilities make it difficult to ensure hand hygiene. This is a common practice as reported in other studies as well [30]. Most students decide on hand sanitizers based on the brands' popularity and manufacturers' origin. The composition of ingredients in the hand sanitizers contributes insignificantly while purchasing hand sanitizers by the participating students. This is also reported in other studies that ingredients of the sanitizers rarely play a role in purchase decision making [31]. Despite the convenience of hand sanitizer use, almost all students perceive that excessive use of hand sanitizers can cause a rash on the skin, skin dryness, abrasion, fissures, itching and soreness. A handful of scientific studies also make it evident that frequent and prolonged hand sanitization causes skin problems, including lesions, acne, dryness, itching, and rash [32]. These findings also highlight the importance of more public awareness and education. These awareness initiatives should focus both on awareness on the safety and efficacy of ABHS and correction of the misconception stated in the findings. Tailored programs focusing on the socio-economic variability of the students could make the initiatives more effective. Leveraging the social media platforms can generate more benefits in this regard since university students spend more time on social media. It is confirmed in studies that social media plays an influential role in the knowledge and behavior regarding hand hygiene practices

[33], [34]. These platforms are effective for dissemination of effective and useful information to wider audiences through verified means. Apart from these initiatives, stringent policies need to be in place to ensure quality control of the ABHS products in Bangladesh. Since the findings of our study align with the global reports on increased health risks associated with the use of substandard sanitizers, regulatory bodies must enforce standard guidelines and protocols. Lessons can be drawn from the countries where there are best efforts of stringent regulatory frameworks such as USA and EU. Unmeasured factors like perception of susceptibility and severity can be undertaken in future studies. Longitudinal studies can also be undertaken to assess the impacts of sustained educational initiatives for behavioral changes in terms of hand hygiene using sanitizers.

5. CONCLUSION

The findings of this study indicate that university students have insufficient knowledge regarding the composition and efficacy of alcohol-based hand sanitizers. Most factors did not significantly affect the knowledge and practice score associated with ABHS use of the students about sanitizers and disinfectants. However, factors including age, sex, and family income influence the knowledge and practice score associated with using ABHS among the participating students. The study reiterates the need for multifaceted and dedicated efforts in behavioral awareness programs to address the gaps in knowledge and practice associated with hand hygiene. Though this study provides a comprehensive picture of knowledge and practices regarding hand sanitizers use among university students, experts' review of the findings could have increased the reliability of the results. Further studies can draw a comparative analysis among different demographic groups.

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AUTHOR CONTRIBUTIONS STATEMENT

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C : **C**onceptualization
M : **M**ethodology
So : **So**ftware
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Fo : **Fo**rmal analysis
I : **I**nvestigation
R : **R**esources
D : **D**ata Curation
O : Writing - **O**riginal Draft
E : Writing - Review & **E**diting
Vi : **Vi**sualization
Su : **Su**pervision
P : **P**roject administration
Fu : **Fu**nding acquisition

CONFLICT OF INTEREST STATEMENT

The authors firmly declare that there are no conflicts of interest in relation to the publication of this journal article. The authors also state that the research is not influenced by any kind of personal, professional and financial interests. This research is purely based on the academic work of the authors and has been done independently.

INFORMED CONSENT

The Survey was conducted online using a Google Form. The study purpose, plan and objectives were shared with some faculty members. They were then requested to circulate the Google Form via Google

Classrooms. In addition, the form has an introductory section where it outlines for participants the study's purpose, methodology, voluntary nature of participation, anonymity, data protection plan, and the right to withdraw at any stage before submission.

ETHICAL APPROVAL

This research adhered to the ethical principles of research where human subjects are involved. Ethical approval was taken from the Institutional Review Board of Independent University, Bangladesh.

DATA AVAILABILITY

Derived data supporting the findings of this study. are available from the corresponding author, [MEI], on request.

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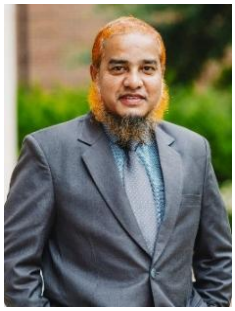

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