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Effect of Knowledge and Attitudes towards Prevention and Control of COVID-19 Infection

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Abstract: *The aim of this paper is to investigate the effect of knowledge (general knowledge on COVID-19 and transmission knowledge on COVID-19) and attitudes towards prevention and control of COVID-19 contamination. In this study, an online survey approach was used, and primary data were collected through structured questionnaire from 410 respondents' who actively participated in the survey. This study is conducted based on Theory of Planned Behavior (TPB). Five (5) research hypotheses were constructed in order to fulfill the objective of this study. The proposed research hypotheses were tested by using PLS-SEM techniques. The results showed that entirely all five hypotheses were accepted. Precisely, general knowledge on COVID-19, transmission knowledge on COVID-19 and attitudes towards prevention & control positively contributes to the behavior towards prevention and control of COVID-19 infection. Furthermore, the findings suggest that proper knowledge and optimistic attitudes on COVID-19 may change the behavioral pattern of people to prevent and control the COVID-19 infection. The outcomes of this study are significant to convey future efforts to focus on social preparation to conform the pandemic control measures. One of the significant drawbacks of this study is that the data was collected through online questionnaire survey and during pandemic.*

Keywords: COVID-19, Transmission knowledge, Attitudes, Behavior, Prevention & control of COVID-19, Pandemic.

1. Introduction

COVID-19 is an RNA virus that has a distinctive coronary form on an electron microscope because of glycoprotein shape in its envelope (Perlman & Netland, 2009). Pneumonia seems to be the most common manifestation of a severe infection, exhibited primarily by fever, cough, dyspnea, and bilateral infiltration on chest imaging (Yang et al., 2020). Coronavirus COVID 19 first appeared in Wuhan, China at the end of 2019 and after that it has spread all over the world and the World Health Organization (WHO) in January 30, 2020 has declared it an epidemic. Overall death rate due to the COVID-19 is 2.3%

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in China, less than those of SARS (9.5%), MERS (34.4%), and H7N9 (39.0%), (Chen et al., 2020; Munster et al., 2020). It is reported that the Europe, the United States of America, Brazil and India have the highest cases in the world as well as the highest mortality. BBC reported that in Bangladesh the first positive COVID-19 patient was identified on March 08, 2020. All educational institutions of Bangladesh closed on March 17, and experienced 1st COVID-19 death on March 18, 2020 (Bangladesh, 2020). The Bangladesh Government announced nationwide lockdown on March 26. As Bangladesh is one of the most densely populated countries, labor-oriented industry and most of the people survive their life from the daily earnings through informal professions (Perera, 2020) so that the law enforcement bodies like Bangladesh Police and Bangladesh Army were always on move on roads and residential areas for strengthening implementation of lockdown. Although there was a sufficient arrangement from the authority to control the risk of spreading the virus but it is evident of little incoordination due to lack of understanding of various socio demographic groups (Corporation, 2020). It is clear that all the initiative taken by government was not sufficient to control the COVID-19 pandemic. In our study, we examine the effect of knowledge on symptom of COVID-19 and transmission of COVID-19 on attitudes and behavior towards prevention and control of COVID-19.

In the prior forty years, knowledge, attitudes and practices (KAP) study has always been the key educational interruption tactic of global lung disease resistor (Suleiman et al., 2014). Several researchers report that a person's KAP level is related to effective disease control and prevention, retort to medications, and improvement of personal health (Khalil & Abdalrahim, 2014; Matsumoto-Takahashi et al., 2015; Turkestani et al., 2013). Lower KAP levels were other major indicators of poor health, unproductive health care, a decline in disease screening rates, and unrealistic preventive behaviors for different infections under different conditions (Alkot et al., 2016). Knowledge, attitude and practice (KAP) towards COVID-19 play an indispensable part in defining the actions of society to admit the behavioral changes of health experts. Research into knowledge, attitude and practice (KAP) provides vital information to govern the type of intervention that may be needed to transform the misunderstandings about the virus. The assessment of KAP associated to COVID 19 among the public will be useful to offer a better understanding to address the poor knowledge of disease and the growth of preventive measures and health promotion programs (Person et al., 2004; Tao, 2003). Most previous studies assess the knowledge, attitudes and prevention practices of Health profession personnel. In this study we investigate the effect/association of knowledge and attitudes towards prevention and control of COVID-19 among the Bangladeshi public by using the extended theory of planned behavior (TPB) and Theory of Reasoned Action (TRA) (Chowdhury et al., 2020a; Chowdhury et al., 2020b; Chowdhury et al., 2020c; Chowdhury et al., 2020d; Chowdhury et al., 2020e; Chowdhury et al., 2021).

2. Literature Review

According to Organization (2020), fever, cough, and fatigue is the general sign of COVID-19 sickness as well as it includes sputum production, headache, haemoptysis, diarrhea, dyspnoea, and lymphopenia (Organization, 2020). While genetically SARS-COV and SARS-COV-2 are similar but in case of transferability, viral shedding and other characteristics are distinct from each other (Heymann & Shindo, 2020; Liu et al., 2020; Zhou et al., 2020; Peiris et al., 2003). Transmission of COVID-19 virus through person to person, focal-oral, droplet and direct contact with affected human. Infected/sick person has to be required an isolation period of 2-14 days (Backer et al., 2020). Prevention (2020) identified that in case of normal flu and lung pathogens virus transmitted through dews of cough and sneeze, similarly SARS-CoV-2 spreading among person to person. CDC announced that disease-ridden persons' cough or sneezes, huge breathing dews stated from the patients' mouth and nose possible to spread disease from the infected patients to a sound and healthy person. Dews thrown/pushed from the human mouth landed straight on the mucous membrane of the mouth, nose, or eyes of a closer person or on the exterior of substances. The virus spread through mucous membranes, mainly nasal and larynx mucosa, then enters into the lungs through breathing zone. At that point, the virus breaks into the targeting tissues that prompt angiotensin converting enzyme 2(ACE2), such as the lungs, heart, renal system and gastrointestinal region (Chen et al., 2020; Bennardo et al., 2020; Rose-John, 2018). Breathing droplet spread is the main medium of viral the disease from person to person and also by the symptomless movers (Lupia et al., 2020; Yang et al., 2020). Social human contact is the main medium of transmission of Corona virus among people (Memish et al., 2019) so that billions were forced into lockdown to control spreading rate (Anderson, 2020). The real method of identification of the Covid-19 virus is real-time reverse transcription polymerase chain reaction (rRT-PCR) from a nasopharyngeal swab (Prevention, 2020). It may also be identified by the CT scan which shows the features of pneumonia (Prevention, 2020; Organization, 2020; Islam et al., 2021a; Islam et al., 2021b).

In 2003, SARS outburst experience suggests that knowledge and attitudes about transmittable sicknesses create fear among the general human which sometimes obstruct initiative to control preventive measures (Person et al., 2004; Tao, 2003). According to Organization (2020), European Centre, Public Health England, National Health Commission of the People's Republic of China said that protective initiations and instructions are formulated on the basis of the previous experiences and responding strategies of MERS-COV or SARS-COV outbreaks. The Organization (2020) suggests maintaining incubation for infected person of COVID-19 in between 2-14 days. Although, several research proposes that the period of isolation may last for more than 2 weeks and also it has the possibility of repeat infection of disease due to the longer period of incubation.

Numerous studies suggest 14 days medical observation period is required for the person who is infected with the COVID germ. The intensive care of the affected person for clinical treatment related with age (more than70 years), also including for example: diabetes, chronic obstructive pulmonary disease (COPD), hypertension, obesity and male sex but presently no logically effective clarification have been established (Wu et al., 2020; Zhou et al., 2020; Han et al., 2020). Organization (2020) recommended that basic preventive measures consists of practicing frequently hand washing, maintaining social distancing, breathing hygiene (keeping wrapper on mouth and nose while coughing or sneezing). Most of the people are unaware about the severity of spread of the corona virus and rapidness of the transmission from person- to-person only be controlled through lockdown measures (Cao J. et al., 2020). SARS and MARS Pandemic experience suggests that lockdown require since researchers or scientists require time to invent a injection or vaccine or active treatment for people around the world (El Zowalaty & Jarhult, 2020; Hui & Zumla, 2019; Abdirizak et al., 2019).

Knowledge, attitudes, and practices with KAP theory of human being have a high influence in preventing the viral of COVID-19 (Ajilore et al., 2017). Health care workers like doctors, nurses, cleaner etc. at the front lines are showing to dangers like pathogen contact, lengthy working hour, physiological suffering, tiredness, professional pressure and corporal ferocity. Lack of knowledge results delay in identification and treatment may ultimately increase the rate of spreading the contaminations (Organization, 2020). There is an insufficiency of literature on KAPs of Health Care Workers (HCWs) towards the COVID-19 pandemic. Conversely, according to a survey of medical professionals (mostly Asian health care workers and medical pupils), while they do not have enough knowledge about COVID-19, however had a positive attitudes of preventing COVID-19 transmission (Bhagavathula, 2020). Infections can be controlled by repetitive hand washing and keeping distance from symptomatic people, covering coughs and sneezes with a tissue or inner elbow and keeping dirty or unwashed hands outward from the face (Salehi et. al. 2020). Masks are suggested for the person who has symptoms and provides take care for the patients (Organization, 2020; Mishu et al., 2020).

2.1 Theoretical Framework and Hypothesis Development

This study is directed to the Theory of Reasoned Action (TRA) or Theory of Planned Behavior (TBP), developed by Ajzen and Fishbein (1980). The main focal point of this theory is that exact knowledge of objects is a precondition for establishing attitudes to that object. TRA and TPB are proposed in their purest form, and behavior is generated by intent, while intending is a function of attitude and subjective specifications. It is advisable to include the actual behavior reported by the participants themselves in the model, as the final issue is behavior, not intent (Polonsky et al., 2012; Rokka & Uusitalo, 2008). This study applies an extended model that general knowledge on covid-19 and knowledge

on transmission of COVID-19 as the antecedents of attitudes towards prevention & control of COVID-19, which successively hypothesize the relationship with behavior towards prevention and control of COVID-19 (see Figure 1).

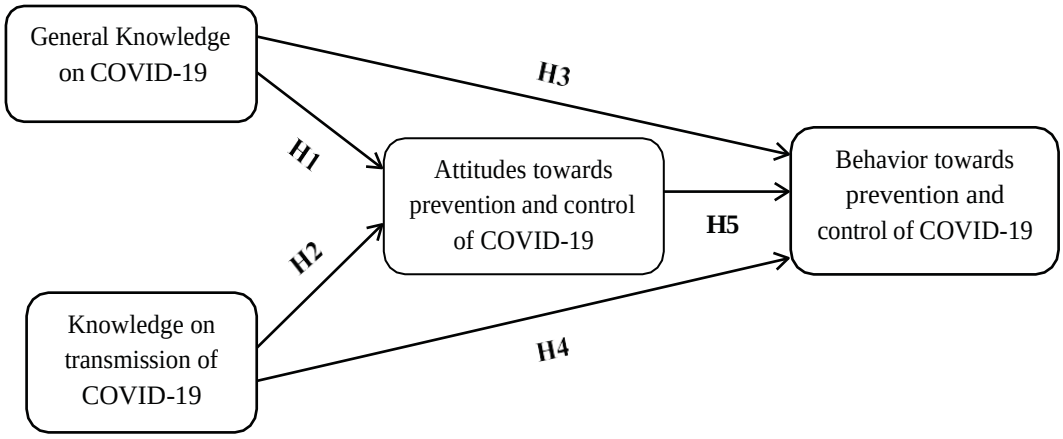

Figure 1: Theoretical Model of the Study (Source: Authors' Compilation)

3. Methodology

This study was conducted in Bangladesh. In order to fulfill the research objectives, a cross-sectional design was adapted i.e. to measure the effect of COVID-19 knowledge (here we used two dimensions on knowledge about COVID-19; one is symptoms and another is transmissions) and attitudes on prevention and control practices of COVID-19. A structured questionnaire was prepared using Google form and link was shared through mail, Facebook groups and authors' other network. There were 19 items that used to measure symptoms & transmission knowledge of COVID-19, attitudes towards prevention & control of COVID-19 and Behavior towards prevention and control of COVID-19. Construct knowledge was adapted from Zhong et al. (2020); attitudes were adapted from Goni et al. (2020) and preventions and control were adapted from the World Health Organization (Organization, 2020) & Centers for Disease Control and Prevention (Prevention, 2019). All the items on the questionnaire were adapted from the previous study. A five-point Likert scale (strongly disagree = 1, disagree = 2, neutral =3, agree =4, and strongly agree = 5) was applied to all constructs. Data was collected from 410 respondents who voluntarily participated in online survey. Suggested sample size between 30 and 450 is considered good for statistical analysis like, structural equation modeling (wolf et al., 2013). In this paper PLS-SEM was used to analyze the sample data, by using the SMARTPLS 3.0 software.

4. Data Analysis

Table 1: Demographic Features of Respondents (n = 410)

Characteristic		Frequency	Percentage (%)
Gender	Male	247	60.2
	Female	163	39.8
Age	18-25	48	11.7
	26-32	159	38.8
	33-40	127	31.0
	41-47	54	13.2
	More than 48	22	5.4
Marital Status	Married	343	83.7
	Single	67	16.3
Education	SSC	15	3.65
	HSC	41	10.0
	HONUR'S	208	50.74
	MASTER'S	146	35.61
Profession	Business	125	30.49
	Student	65	15.85
	Service	128	31.22
	Unemployed	92	22.44
Main Sources of knowledge covid-19	WOM(Word of mouth)	212	51.7
	Social media (Facebook, Instagram, twitter etc.)	118	28.8
	Family, friends, etc.	44	10.7
	TV/radio/newspaper/advertisement	7	1.7
	World Health Organization (WHO)	15	3.7
	Ministry of Health (MOH)	14	3.4

Source: Survey

Table -1 demonstrate the most of the participants are male (60.2%) and female (39.8%), of age 26 to 46 (83%), complete their bachelors and master's degree (86.35%), 83.7% respondents are married. 61.71% respondents are involved in business & services. 80.5% respondents said that they collect or obtain knowledge on COVID-19 through word of mouth and social media (Siddique et al., 2021; Skiba et al., 2021).

4.1 Measurement Model

The measurement model was evaluated through convergent validity and discriminant validity. Convergent validity is checked by using factor loading, average variances

extract (AVE) and composite reliability as recommended (Hair et al., 2014). In this study, loading of all items were more than 0.5, AVE value were above 0.5 and also CR value were over 0.7. According to the results of primary measurement model six (6) items were removed due to poor factor loading, remaining total 13 items for the final analysis (Table 2).

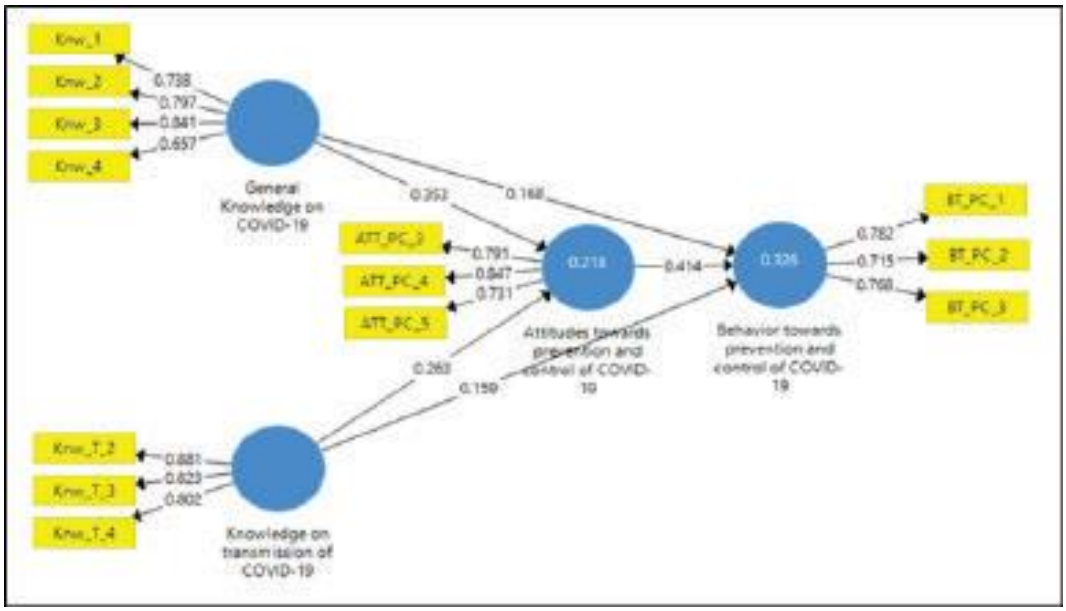

Figure 2: Model after Trimming (Source: Estimated)

Table 2: Convergent Validity

Variables	Items	Loading	CR	AVE
General Knowledge on COVID-19 (Knw)	Knw_1	0.738	0.846	0.580
	Knw_2	0.797		
	Knw_3	0.841		
	Knw_4	0.657		
Knowledge on transmission of COVID-19 (Knw_T)	Knw_T_2	0.881	0.874	0.699
	Knw_T_3	0.823		
	Knw_T_4	0.802		
Attitudes towards prevention and control of COVID-19 (Att_PC)	Att_PC_3	0.791	0.834	0.626
	Att_PC_4	0.847		
	Att_PC_5	0.731		
Behavior towards prevention and control of COVID-19 (BT_PC)	BT_PC_1	0.782	0.800	0.571
	BT_PC_2	0.715		
	BT_PC_3	0.768		

Source: Estimated.

The Fornell and Larcker (1981) criterion has been used to measure the discriminant validity which refers to the square root of each constructs' AVE value must be greater than its highest correlation with any other construct. Hence in this study, Table - 3 demonstrated that data fulfill the criteria of discriminant validity (Zayed et al., 2021).

Table 3: Fornell-Larcker Criterion

		1	2	3	4
1	Attitudes towards prevention and control of COVID-19	0.791			
2	Behavior towards prevention and control of COVID-19	0.528	0.756		
3	General Knowledge on COVID-19	0.388	0.349	0.761	
4	Knowledge on transmission of COVID-19	0.309	0.308	0.129	0.836

Source: Estimated.

However, it is currently criticized that the Fornell and Larker (1981) criterion are unreliable for detecting discriminant validity under certain circumstances. The heterotrait-monotrait ratio of correlations (HTMT) is used as a new standard for assessing the discriminant validity recommended by Henseler et al. (2015). Henseler et al. (2016) suggested a lower and more conservative cut-off value of HTMT ratio is o.85. In this study all the HTMT value is below 0.85 which proved the discriminant validity (see Table 4).

Table 4: Heterotrait-Monotrait Ratio (HTMT)

		1	2	3	4
1	Attitudes towards prevention and control of COVID-19				
2	Behavior towards prevention and control of COVID-19	0.779			
3	General Knowledge on COVID-19	0.489	0.475		
4	Knowledge on transmission of COVID-19	0.366	0.381	0.122	

Source: Estimated.

4.2 Measurement of Structural Model

The structure model has been used to estimate the hypothesized relationships between the constructs. For measuring the structural model, the authors used VIF, the signifi-

cance of structural path, coefficient of determinant (R2), effect size (f2) and predictive relevance (Q2) recommended by Hair et al. (2017). At first check the colinearity issues of structural model. Results illustrate the variance inflation factors (VIF) values of all the constructs or paths are less than cut-off of value 3.30, demonstrating there is no issues of multicollinearity in the model (Hair et al., 2017). Next, see the significance of path relationships, analysis suggest that all hypotheses were accepted (see Table 5).

Table 5: Structural Model

Hypothesis	**Std. beta**	**SE**	**t-value**	**Decision**	**f^2**	**VIF**
GKN -> ATT_PC **[H1]**	0.353	0.049	7.209	Accepted	0.157	1.017
KNT -> ATT_PC **[H2]**	0.263	0.042	6.273	Accepted	0.087	1.017
GKN -> BTPC **[H3]**	0.168	0.050	3.371	Accepted	0.036	1.177
KNT -> BTPC **[H4]**	0.159	0.041	3.845	Accepted	0.034	1.106
ATT_PC -> BTPC **[H5]**	0.414	0.053	7.874	Accepted	0.198	1.279

Source: Estimated.

General Knowledge on Covid-19 meaningfully predicts Att_PC of COVID-19, therefore H1 is acceptable given that ($\beta = 0.353$, $t = 7.209$, $p < 0.001$). Kn_T of COVID-19 meaningfully predicts Att_PC of COVID-19 with H2 confirmed that ($\beta = 0.263$, $t = 6.273$, $p < 0.001$). General Knowledge on Covid-19 has strong significant relationship with behavior towards prevention and control of COVID-19, so H3 is acceptable given that ($\beta = 0.168$, $t = 3.371$, $p < 0.001$). These findings are similar to that for knowledge on transmission of COVID-19 and attitudes towards prevention and control of COVID-19, both of which meaningfully influence behavior towards the Prevention & Control Covid-19. Therefore, H4 and H5 are correspondingly confirmed with ($\beta = 0.159$, $t = 3.845$, $p < 0.001$) and with ($\beta = 0.414$, $t = 7.874$, $p < 0.01$).

The R2 values for endogenous constructs, like Att_PC of Covid-19 and behavior towards the Prevention & Control Covid-19 were 0.218 and 0.326 correspondingly (see Figure 2), indicating that in-sample explanatory power of this research model in satisfactory level. Since R2 values of all endogenous constructs were higher than recommended threshold value 0.02 (Cohen, 1988). Furthermore, to assessing R2 value, we also examine whether exclusion of a specific exogenous construct leads to a variation in R2 by computing the f2 effect size. For assessing the magnitude of f2, we use Cohen's (1988) reference for exogenous variables, where small, medium and large effects are represent-

ed by the values of 0.02, 0.15 and 0.35 respectively. Authors investigate most of the exogenous variables have effect size ranging from small to medium. A lastly, calculate the Q2 values of endogenous constructs (Att_PC of Covid-19 and BT_PC of Covid-19) are more than zero, suggesting predictive relevance of the model (Hair et. al, 2016).

5. Discussion and Conclusion

Message experienced from the SARS epidemics that knowledge and attitudes are strongly connected with the level of fear and feeling which may create obstacle to the initiatives taken to control the dispersion of the virus (Person et al., 2004; Tao, 2003). The influential factors and way of associated impact are still imprecise in the exiting literature. In this research, the Bangladeshi people were considered as the respondents and extended the viewpoint of theory of planned behavior in two variables – knowledge on symptom and knowledge on transmission of COVID-19, to construct a model for showing the effect of knowledge of symptom and transmission of COVID-19 on attitudes and behavior towards prevention and control of COVID-19.

The study's findings established that both general knowledge i.e. knowledge on symptom of COVID-19 and knowledge on transmission of COVID-19 have positive and significant effect on attitudes towards prevention and controls of COVID-19 (H1 and H2). Attitudes towards prevention and control of COVID-19 also have a positive and important influence on behavior towards prevention and controls of COVID-19 (H5). Furthermore, the results show that knowledge on symptom and transmissions of COVID-19 both have a significant positive correlation with behavior towards prevention and controls of COVID-19 (H3 and H4). These findings agree with the findings of (Person et.al 2004; Tao, 2003). However, both have a relatively smaller effect coefficient on the behavior towards prevention and controls of COVID-19, which are obviously smaller than that of attitudes towards prevention and control of COVID-19. Therefore, appropriate knowledge and attitudes towards COVID-19 may result change in behavioral pattern in the healthcare firms, general people and, as a whole, the society. Correct insight about COVID helps to address initiation of appropriate defensive strategies and publicity programs by government and other related parties.

References

1. Abdirizak, F., Lewis, R. & Chowell, G. (2019). Evaluating the potential impact of targeted vaccination strategiesagainst severe acute respiratory syndrome coronavirus (SARS-CoV) and Middle East respiratory syndrome coronavirus (MERS-CoV) outbreaks in the healthcare setting. Theoretical Biology and Medical Modelling. 16(1), 16.
2. Ajilore K., Atakiti, I. & Onyenankey, K. (2017). College students' knowledge, attitudes and adherence to public service announcements on Ebola in Nigeria:

Suggestions for improving future Ebola prevention education programmes. *Health Education Journal. 76,* 648-60

3. Ajzen, I. & Fishbein, M. (1980). Understanding attitudes and predicting social behavior. Englewood. Cliffs, NJ: Prentice-Hall.
4. Alkot, M, Albouq, M. A, Shakuri, M. A. & Subahi, M. S. (2016). Knowledge, attitude, and practice toward MERS-CoV among primary health-care workers in MakkahAl-Mukarramah: an intervention study. *Int J Med Sci Public Health. 5* (05), 952
5. Anderson, R. M, Heesterbeek, H., Klinkenberg, D. & Hollingsworth, T. D. (2020). How will country-based mitigation measures influence the course of the COVID-19 epidemic? *The Lancet. 395* (10228), 931–4.
6. Bennardo, F., Buone, C. & Giudice, A. (2020). New therapeutic opportunities for COVID-19 patients with Tocilizumab: Possible correlation of interleukin-6 receptor inhibitors with osteonecrosis of the jaws. *Oral Oncol.*
7. Backer, J., Klinkenberg, D. & Wallinga, J. (2020). Incubation period of 2019 novel coronavirus (2019-nCoV) infections among travelers from Wuhan, China, 20–28 January 2020. *Euro Surveill. 25* (5).
8. Bhagavathula, A. S., Aldhaleei, W. A., Rahmani, J., Mahabadi, M. A. & Bandari, D. K. (2020). Novel coronavirus (COVID-19) knowledge and perceptions: A survey on healthcare workers. *medRxiv.*
9. Bangladesh, U. N. (2020). *Bangladesh confirms second coronavirus death.*
10. Corporation, B. B. (2020). Coronavirus: One month of identifying the first case, what is the current situation of Bangladesh?
11. Cohen, J. (1988). *Statistical power analysis for the behavioral sciences.* Erlbaum, Routledge,
12. Chen, C., Zhang, X. R., Ju, Z. Y. & He, W. F. (2020). *Advances in the research of cytokine storm mechanism induced by Corona Virus Disease 2019 and the corre sponding immunotherapies.* 36 (06).
13. Chen, N., Zhou, M., Dong, X., Qu, J., Gong, F. & Han, Y. (2020). Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *The Lancet.* 395, 507-13
14. Cao, J., Tu, W. J., Cheng, W., Yu, L., Liu, Y. K. & Hu, X. (2020). Clinical features and short-term outcomes of 102 patients with corona virus disease 2019 in Wuhan, China. *Clin Infect Dis.* 243.
15. Chowdhury, S., Mishu, A. A., Rahman, M. M. & Zayed, N. M. (2020a). An Analysis of Factors for Acute Respiratory Infections (ARI) in Children under Five of Age in Bangladesh: A Study on DHS, 2014. *Journal of Midwifery, Women Health & Gyneco logical Nursing.* 2(2), 26-32.
16. Chowdhury, S., Rahman, M. M. & Zayed, N. M. (2020b). Factors Affecting Early Marriage in Bangladesh: An Analysis on BDHS, 2014 Data. *Journal of Humanities, Arts and Social Science.* 4(1), 40-47.

17. Chowdhury, S., Rahman, M. M., Raisa, T. S., Akhter, S. & Zayed, N. M. (2020c). A Nexus among Air Pollution, Energy Consumption and Agricultural Productivity in Bangladesh: An ARDL Model with Structural Break. *International Journal of Management (IJM).* 11(7), 93-103.
18. Chowdhury, S., Rahman, M. M., Zayed, N. M. & Afrin, M. (2021). Prevalence of Vaccination for Measles in Bangladesh among Children of Age under Two. *Journal of Perinatal, Pediatric and Neonatal Nursing.* 3(1), 1-7.
19. Chowdhury, S., Rahman, M. M. & Zayed, N. M. & Shahi, S. K. (2020d). Determinants of Age at First Birth of Bangladeshi Women: A Multivariate Approach on DHS 2014 Data. *Journal of Humanities, Arts and Social Science.* 4(2), 118-125.
20. Chowdhury, S., Hasan, K. B. M. R., Rahman, M. M., Islam, K. M. A., Zayed, N. M. (2020e). Causal Relationship among Carbon Dioxide (CO2) Emissions, Renewable Energy, Population and Economic Growth in Bangladesh: An Empirical Study. *Research in World Economy.* 11(6), 196-206
21. El Zowalaty, M. E. & Jarhult, J. D. (2020). From SARS to COVID-19: A previ ously unknown SARSCoV-2 virus of pandemic potential infecting humans–Call for a One Health approach. *One Health,* 100124.
22. Fornell, C. & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research.* 18 (1), 39-50.
23. Goni, M. D, Naing, N. N., Hasan, H., Wan-Arfah, N., Deris, Z. Z. & Arifin, W. N. (2020). Development and validation of knowledge, attitude and practice questionnaire for prevention of respiratory tract infections among Malaysian Hajj pilgrims. *BMC Public Health*, 20, 189.
24. Hair, J. F., Hult, G. T. M., Ringle, C. M. & Sarstedt, M. (2016). *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM),* Sage Publication, Los Angeles.
25. Hair, J. F., Sarstedt, M., Hopkins, L. & Kuppelwieser, V. G. (2014). Partial least squares structural equation modeling (PLS-SEM): an emerging tool in business research. *European Business Review*, 26 (2), 106–121.
26. Hair, J. F., Hult, G. T. M., Ringle, C. M. & Sarstedt, M. (2017) *A primer on partial least squares structural equation modeling. Sage*, Thousand Oaks, California.
27. Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new riterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science.* 43, 115–135.
28. Henseler, J., Hubona, G. & Ray, P. A. (2016). Using PLS Path Modeling in new technology research: Updated guidelines. *Industrial Management & Data Systems.* 116(1), 2–20.
29. Heymann, D. & Shindo, N. (2020). WHO scientific and technical advisory group for infectious hazards. COVID-19: what is next for public health. *The Lancet.* 395, 542–545.
30. Hui, D. S. & Zumla, A. (2019). Severe acute respiratory syndrome: Historical,

epidemiologic, and Clinical features. *Infectious Disease Clinics.* 33(4), 869–89.

31. Han, W., Quan, B., Guo, Y., Zhang, J., Lu, Y., Feng, G., Wu, Q., Fang, F., Cheng, L. & Jiao, N. (2020). The course of clinical diagnosis and treatment of a case infected with coronavirus disease 2019. *J. Med. Virol.* 92(5), 461–463.
32. Islam, M. R., Chowdhury, S. A., Rahman, S. & Zayed, N. M. (2021a). An Analysis of the Detrimental Effect of COVID-19 Pandemic: A Study in Bangladesh. *Journal of Humanities, Arts and Social Science.* 5(1), 116-124.
33. Islam, M. R., Suraiya, S., Zayed, N. M., Hasan, K. B. M. R., Bipasha, M. S. & Nitsenko, V. (2021b). Assessing the Effect of the COVID-19 Pandemic on the Government Revenues: A Study on Individual Taxpayers of Bangladesh. *Naukovyi Visnyk Natsionalnoho Hirnychoho Universytetu.* 5, 154-159.
34. Khalil, A. & Abdalrahim, M. (2014). Knowledge, attitudes, and practices towards prevention and early detection of chronic kidney disease. *Int Nurs Rev.* 61(2), 237–45
35. Liu, Y., Gayle, A. A. & Wilder-Smith, A. (2020). The reproductive number of COVID-19 is higher compared to SARS coronavirus. *J Travel Med.* 27(2), 21.
36. Lupia, T., Scabini, S., Mornese P. S., Di Perri, G., De Rosa, F. G. & Corcione, S. (2020). 2019 novel coronavirus (2019-nCoV) outbreak: A new challenge. *Journal of Global Antimicrobial Resistance.* 21, 22–27.
37. Matsumoto-Takahashi, E. L. A., Tongol-Rivera, P., Villacorte, E. A., Angluben, R. U., Jimba, M. & Kano, S. (2015). Patient knowledge on malaria symptoms is a key to promoting universal access of patients to effective malaria treatment in Palawan, the Philippines. *PLoS One.* 10(6).
38. Munster, V. J., Koopmans, M., Van Doremalen, N., Van Riel, D. & De Wit, E. (2020). A Novel coronavirus emerging in china - Key questions for impact assessment. *N Engl J Med.* 382, 692-4.
39. Memish, Z. A., Steffen, R., White, P., Dar, O., Azhar, E. I. & Sharma, A. (2019). Mass gatherings medicine: Public health issues arising from mass gathering religious and sporting events. *The Lancet*. 393(10185), 2073–84.
40. Mishu, A. A., Chowdhury, S., Bipasha, M. S., Raisa, T. S. & Zayed, N. M. (2020). Material Nutritional Status as Determinants of Child Malnutrition under Age 5 in Bangladesh: A Multivariate Approach. *International Journal of Management (IJM).* 11(8), 1-9.
41. Organization, W. H. (2020). Infection prevention and control during health care when novel coronavirus (nCoV) infection is suspected: interim guidance.
42. Polonsky, M. J., Vocino, A., Grau, S. L., Garma, R. & Ferdous, A. S. (2012). The Impact of general and carbon-related environmental knowledge on attitudes and behaviour of US consumers. *Journal of Marketing Management.* 28(3-4), 238-263.
43. Prevention, C. D. C. (2019). *Update and interim guidelines on outbreak of 2019 Novel coronavirus (2019-nCoV).*
44. Prevention, C. D.C. (2020). *Interim Guidelines for Collecting, Handling and Testing Clinical Specimens from Persons for Coronavirus Disease 2019 (COVID-19).*

45. Perera, W. (2020). *Bangladesh government downplays COVID-19 threat as job losses mount.*
46. Perlman, S. & Netland, J. (2009). Coronaviruses post-SARS: Update on replication and pathogenesis. Nat. Rev. *Microbiol.* 7, 439–450.
47. Person, B., Sy, F., Holton, K., Govert, B. & Liang, A. (2004). Fear and stigma: The epidemic within the SARS outbreak. *Emerg Infect Dis.* 10, 358–63.
48. Peiris, J. S. M., Chu, C. M. & Cheng, V.C. (2003). Clinical progression and viral load in a community outbreak of coronavirus-associated SARS pneumonia: A prospective study. *The Lancet,* 361, 1767–1772.
49. Rokka, J. & Uusitalo, L. (2008). Preference for green packaging in consumer product choices – Do consumers care? *International Journal of Consumer Studies.* 32, 516–525.
50. Rose-John, S. (2018). Interleukin-6 family cytokines. Cold Spring Harb. Perspect. *Biol.* 10.
51. Salehi, S., Abedi, A., Balakrishnan, S. & Gholamrezanezhad, A. (2020). Coronavirus disease 2019 (COVID-19): A systematic review of imaging findings in 919 patients. *American Journal of Roentgenology*. 1–7.
52. Suleiman, M., Sahal, N., Sodemann, M., Elsony, A., Aro, A. R. (2014). Tuberculosis awareness in Gezira, Sudan: Knowledge, attitude and practice case-control survey. *East Mediterr Health J.* 20(2), 120.
53. Siddique, F. K., Hasan, K. B. M. R., Chowdhury, S., Rahman, M., Raisa, T. S. & Zayed, N. M. (2021). The Effect of Foreign Direct Investment on Public Health: Empirical Evidence from Bangladesh. *Journal of Asian Finance, Economics and Business*. 8(4), 0083–0091.
54. Skiba, A. P., Rodionov, A. V., Onishchenko, I. S., Tunchik, T. S., Kharitonovich, C. D. & Zayed, N. M. (2021). Problems of Medical Parole Legal Regulation in Russia and in Certain Foreign Countries. *Journal of Legal, Ethical and Regulatory Issues.* 24(5), 1-10.
55. Tao, N. (2003). An analysis on reasons of SARS-induced psychological panic among students. *J Anhui Inst. Educ.* 21, 78–9.
56. Turkestani, A., Balahmar, M., Ibrahem, A., Moqbel, E. & Memish, Z. (2013). Using health educators to improve knowledge of healthy behaviour among hajj 1432 (2011) pilgrims. *East Mediterr Health J.* 19 (2), 9–12.
57. Wolf, E., Harrington, K. M., Clark, S. L. & Miller, M. W. (2013). Sample size requirements for structural equation models an evaluation of power, bias, and solution propriety. *Edu. Psychol. Meas.* 73, 913-934.
58. Wu, C., Chen, X., Cai, Y., Xia, J., Zhou, X., Xu, S., Huang, H., Zhang, L., Zhou, X. & Du, C. (2020). Risk factors associated with acute respiratory distress syndrome and death in patients with coronavirus disease 2019 pneumonia in Wuhan, China. *JAMA Intern. Med.*
59. Yang, Y., Peng, F., Wang, R., Guan, K., Jiang, T., Xu, G., Sun, J. & Chang, C. (2020). The deadly coronaviruses: The 2003 SARS pandemic and the 2020 novel

coronavirus epidemic in China. *J. Autoimmun.*

60. Zhong, B. L., Luo, W., Li, H. M., Zhang, Q. Q., Liu, X. G. & Li, W. T. (2020). Knowledge, attitudes, and practices towards COVID-19 among Chinese residents during the rapid rise period of the COVID-19 outbreak: a quick online cross-sectional survey. *Int J Biol Sci.* 16, 1745–52.
61. Zhou, F., Yu, T., Du, R., Fan, G., Liu, Y., Liu, Z., Xiang, J., Wang, Y., Song, B. & Gu, X. (2020). Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: A retrospective cohort study. *The Lancet.*
62. Zayed, N. M., Khan, S., Shahi, S. K. & Afrin, M. (2021). Impact of Coronavirus (COVID-19) on the World Economy, 2020: A Conceptual Analysis. *Journal of Humanities, Arts and Social Science.* 5(1), 1-5.