

Knowledge, attitudes and preventative practices (KAPs) towards COVID-19 among international students in China

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Research Article

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Abstract

Introduction: Despite the world having history of fighting pandemics the coming of Corona virus disease 2019 (COVID-19), which started in Wuhan in China late last year, has had the worst devastating impacts the world has never seen before. The study aimed to find out about the knowledge, attitudes and preventative practices of COVID-19 among international students in China during the pandemic.

Material and methods: A cross-section survey was conducted among 300 international students from 13 different universities in Hubei province of China between March and April 2020 which relied upon convenience sampling method. Data was collected through an online Microsoft questionnaire. The analysis of data was done by using software IBM SPSS version 23 with p-value of 0.05 which was considered as statistical significance. Descriptive analysis and multi-linear regression analysis were conducted to find association between variables.

Results and discussion : Out of 300 respondents 153 (51%) of the respondents were female students, of which the majority were single, undergraduate students who were doing medicine 163 (54.3%) and engineering-programmes 68 (22.7%). The results indicated that the vast majority of international students had an impressive knowledge on the causes, risks and spread of COVID-19 and that they were no misconception of the pandemic 229 (76%) to 281 (98%) respectively. These students also demonstrated a markedly positive attitude towards the virus and a feeling that they were almost complete safe being in China 264 (84%). Variations were found on Knowledge scores in age group ($P < 0.01$) and majors ($P = 0.025$), attitude scores on major of study ($P = 0.015$) and experience ($P < 0.01$). Furthermore, the results revealed that almost all the students 300 (100%) adhered to and practiced set preventive measures against COVID-19 and that there was a positive correlation between attitudes and preventative practices ($r = 0.219$, $P < 0.01$).

Conclusion: This study found that social media platform was contributing enormously towards information dissemination and Chinese universities were commended for their continuous notifications on COVID-19 which helped students to have full knowledge. This, in turn, was instrumental in helping students to form good attitudes and practices towards COVID-19.

1. Introduction

Epidemics and pandemics remain some of the global health problems that have had a huge negative impact on every sector of development around the world. The devastating impact of these epidemics and pandemics can be measured in loss of human lives, total collapse of businesses and a decimated global economy. Available literatures indicate that throughout history, the world has been fighting lethal epidemics and pandemics for a long period of time that has badly affected some particular regions, continents and even the whole world. These range from such pandemics and epidemics as HIV/AIDS[1] (1,2), Ebola in the western African countries i.e. Guinea, Cameroon, Nigeria, Liberia and Sera Leone (3), SARSs[2] in Asian countries including China specifically (4,5), Cholera in most of the African Countries (6–9), and Avian Influenza (Bird flu) (10). Despite the fact that some of the aforementioned epidemics and pandemics have had a trace of origin in specific countries, like that of Ebola in Sub-Saharan Africa, and SARS in Asia, the world has always demonstrated incredible solidarity and sought to fight these epidemics and pandemics together collectively. In late December 2019 in Wuhan City, Hubei Province of People Republic of China the first case of pneumonia known as (2019-nCoV) now COVID-19 was reported with a trace of seafood market. Little did the world know that was just the beginning of the deadly viral disease and it would later bring the whole world to a halt (11,12). The disease proved later to be highly contagious and travelled to the rest of the world at warp speed. On January 13, 2020, the first imported case was also reported in Thailand and since then the cases were reported in Japan and many other countries, it soon became apparent to the world that COVID-19 is a global public health threat and it prompted the WHO[3] to swiftly move in and declare COVID-19 as a global pandemic on 11 March 2020 (13–16). COVID-19 is in a group of zoonotic viruses that can be transmitted through human and animal contacts and that they respiratory viruses cause SARS with symptoms being of fever, coughing which has caused close to 639,317 humans deaths across the world and total affected patients increased more than 15,745,102 as on 26.07.2020 (17).

Many scholars have explained extensively on epidemics and pandemics as it is the subject area that affects the survival of human life which is the utmost resource in any development endeavour. In their studies, they have sought to place interest in variables of KAPs[4] of specific epidemics or pandemic. Some explained on KAPs on HIV/AIDS and its prevention (1,18–20), others have dwelt on KAPs on Cholera and its prevention (7,9,21,22), some have focused on KAPs on Ebola and prevention (5,23,24) and others have focused on KAPs on SARS, N1H1 and their prevention (25,26) with few current research on KAPs on COVID-19 (15,27). While there is huge literature on the KAPs of different kinds of pandemics, but literature about the KAPs of specific pandemics on foreigners' students[5] in other countries is not much available. Consequently, most of the studies were conducted on native students on campuses of colleges and universities (18,19,28) which may be different from the case of the foreign students. Some researchers found out that there is a percentage of risk associated with the status of a person especially migrants and foreigners resident in other countries other than their own (29,30). Therefore, in view of political, social, geographical and other factors that converge in China, this research sought to bridge the existing gap in the literature on the KAPs of COVID-19 among international students especially with this current pandemic of COVID-19 which has brought the whole world to a virtual standstill, a scenario that has never happened before in recent history. The main aim of this study was to find out the KAPs of the COVID-19 among international students' resident in China at the time of the pandemic and specific objectives are i) to find out knowledge about COVID-19 among international students' resident in China, ii) to analyze the formed attitudes of the international students towards COVID-19, iii) for investigation if the international students are abiding by and practising preventative practices to steer clear of the COVID-19 pandemic and iv) to analyze the relationship between knowledge, attitudes and preventative measures of the COVID-19.

2. Conceptual Framework

2.1 Dependant variables

In the present study three main variables were analysed a) "Knowledge" which is conceptualised that respondents had knowledge towards the COVID-19 for instance, its causes, symptoms, b) "Prevention and Control Attitudes" conceptualised as the formed perceptions that the respondents had towards the COVID-19 outbreak which were categorised into positive, and negative while, c) lastly "Preventative Practices" which were conceptualised as the level of commitment on the part of respondents in adhering to the preventive measures put in place to stop the spread of COVID-19.

2.2 Independent variables

The independent variables of this study are the social demographic characteristics of the respondents for instance, age, gender, study level, major of study, residence number of years in China, marital status and religion affiliations.

2.3 Non-Controllable variables

The present study also identified other variables which are not given attention in the previous studies and are very crucial to understand the impact to control disease like COVID-19 for example, government policies of hosting, World Health Organization (WHO) and other Non-Governmental Organizations (NGOs) invested in the health sector. Hence, the present study contributes the gap of the study through these variables.

Figure 1: shows relationship between different variables in the study.

3. Materials And Methods

3.1 Study design and setting

This cross-sectional study was carried out during March and April, 2020 among international students those were still present in 10 universities of Hubei Province, China. Further, this study applied a quantitative research methodology. China is among the leading countries in the world that recently had lured throngs of international students from across the globe to come and enrol at some of its prestigious colleges and universities (34). There are a number of reasons for the affinity that China continued to enjoy from foreign students. Some of these included the deliberate initiatives put in place by the Chinese government by offering generous academic scholarships to students for different nationalities. These scholarships are of different kinds and are in perfect sync with China's quest to claim a stake of clout in global affairs and further advance its bosom national interests in the promotion of peace, trade and corporation like Belt and Road Initiative (35). While many students benefited from such initiatives, and there are also droves of students that catered for their study expenses in China under self-sponsored programmes which are in many ways made possible such as low cost of tuition fee, living standards and programme expertise as compared to other countries in the world. Hubei is located in the central part of the people's republic of China which is mostly known of its agricultural activities that are done within the Yangtze river, manufacturing activities, its transportation and communication hub of Wuhan and with also a lot of institutions of higher learning that offer graduate and post graduates programs to both natives and international students (31,32). This area was selected because it is where the Virus started and that it has been hit mostly by it. According to MOE[6], Hubei is among the top ten province in China with highest number of international students with more than 21,371 as at 19 April 2019 with Asian continent dominating with 59.95% seconded by Africa 16.97% (32).

3.2 Population and sampling

The study targeted all undergraduate and postgraduate international students those were present in China during outbreak but not including those who went back home due to holiday and their embassy evacuation processes. This study used convenience sampling to select 13 universities in Hubei province due to easy access and the epicentre province of COVID-19. Due to the fact that many students were evacuated to their countries and others were at holiday the study furthermore, we used this technique with an aim of easy to access of collecting data from the students after the identification of the universities participated in this study were: Central China Normal University, China Three Gorges University, China University of Geoscience, Huazhong Agricultural University, Huazhong University of Science and Technology, Hubei University of Economics, Jiangnan University, Jingchu University of Technology, South-Central University for Nationalities, Wuhan Institute of Technology, Wuhan Textile University, Wuhan University of Technology and Yangtze University.

The data for this study was collected through prepared a standard questionnaire which were sent through online means to identified leaders of international students in universities on voluntarily basis. A total of 380 students were targeted by using 95% confidence level and 5% margin of error, after an assumption that close to more than 50% of the actual students went on winter holidays especially the Asians while other were evacuated back to their respective countries. The response rate was 79%, the study sought not to get equal number of respondents from these thirteen universities, instead focus was placed on the total targeted population.

3.3 Development of an instrument

The questionnaire prepared open ended and closed ended questions that captured qualitative quantitative data. The questionnaire was grouped into four parts i.e. knowledge, attitude, practices and social demographic characteristics. A nominal scale of yes or no questions was applied in all sections of knowledge, attitude and preventative practices while on social demographic data respondents were given choice to select the right one depending to their group or category.

3.4 Data analysis tools

After collecting all data through online Microsoft forms system, it was downloaded and coded into excel and imported into the software IBM SPSS Version 23 where analysis was carried out. Descriptive were used to present frequencies, means scores and standard deviations. One-way ANOVA, Pearson correlation and Binary Logistic were used for analysis of associations with statistical significance being put at 0.05 (two-tailed). The study employed linear regression model output obtained using the backward likelihood ratio.

3.5 Ethical consideration

This study followed the guidelines laid down in the Helsinki Declaration (34) and approval of this study went through the Yangtze University ISO[7] responsible for research ethics. Personal consent was requested from all the respondents who participated in the survey and, as such, this survey was conducted on a voluntary basis and no participant was coerced to provide the information with which to furnish the findings of the study. They were further assured that all information obtained would be solely used for the publication of the study with high level of confidentiality of the data and that names of students would not be indicated in any way unless the owners consented to it or that request was made by them to have their names to be published as well.

4. Results

4.1 Social demographic characteristics of respondents

The Survey targeted 380 respondents. However, information was collected from at least 300 respondents through the administered online questionnaires. In terms of response percentage, that stood at about 79% response rate, of which N=153 (51%) female and N= 147 (49%) were male with total mean=1.5 and SD=0.501. On marital status, the majority the respondents close to N=279 (93%) were single, out of which N= 258 (86%) belonged to the age group of more than 20 but less than 30, about N=237 (79%) of them were pursuing undergraduate studies, of which N=163 (54.3%) were doing medicine-related programme followed by N=68 (22.7%) who were doing engineering courses. Moreover, about N=192 (64%) of the respondents indicated that they had been staying in China for more than 2 years and lastly on religion affiliation about N=155 (51%) of them were Christians followed by N=111 (27.1 %) who were Moslems with total Mean= 1.93 and SD= 1.131(see table 1).

Table 1: Demographic characteristics of respondents

Independent Variable		Frequency	Percent (%)	Valid Percent	Cumulative Percent (%)	Mean	SD
Gender	Male	147	49.0	49.0	49.0		
	Female	153	51.0	51.0	100.0		
	Total (n)	300	100.0	100.0		1.51	0.501
Age Group	<20	19	6.3	6.3	6.3		
	20-30	258	86.0	86.0	92.3		
	30+	23	7.7	7.7	100.0		
	Total (n)	300	100.0	100.0		2.01	0.375
Marital Status	Single	279	93.0	93.0	93.0		
	Married	12	4.0	4.0	97.0		
	Others	9	3.0	3.0	100.0		
	Total(n)	300	100.0	100.0		1.13	0.542
Level of Program	Undergraduate	237	79.0	79.0	79.0		
	Postgraduate	63	21.0	21.0	100.0		
	Total (n)	300	100.0	100.0		1.21	0.408
Major	Medical Related Programs	163	54.3	54.3	54.3		
	Engineering Related Programs	68	22.7	22.7	77.0		
	Agriculture Related Program	21	7.0	7.0	84.0		
	Business Related Program	26	8.7	8.7	92.7		
	Others	22	7.3	7.3	100.0		
	Total (n)	300	100.0	100.0		1.92	1.272
Experience	<1	57	19.0	19.0	19.0		
	1-2	51	17.0	17.0	36.0		
	2+	192	64.0	64.0	100.0		
	Total(n)	300	100.0	100.0		2.45	0.793
Religion Affiliation	Islam	111	37.0	37.0	37.0		
	Christian	155	51.7	51.7	88.7		
	Buddhist	6	2.0	2.0	90.7		
	Hinduism	4	1.3	1.3	92.0		
	Don't want to disclose	19	6.3	6.3	98.3		
	Others	5	1.7	1.7	100.0		
	Total (n)	300	100.0	100.0		1.93	1.131

4.2 Sources of information about COVID-19 disease control and preventative measures

The respondents were asked about the main source of information for COVID-19 disease control and preventative measures, the results indicate that majority of them extracted information from Internet N=211 (70.3%) followed by school notifications N=75 (25%) (see table 2).

Table 2: Showing results on the sources of information

Source of Information	Frequency	Percent (%)
Internet Platforms	211	70.3*
School Notification	75	25.0*
Wires, TV and Radio	7	2.3
Family and Friends	3	1.0
Others Means	4	1.3
Total	300	100.0

Note: *Indicates important significant and major findings at 25%

4.3 Knowledge about COVID-19 disease control and preventative measures

Table 3 shows the results regarding knowledge about COVID-19, the results showed that the majority of the students reveal above the average of 50% which is given as the baseline for good knowledge by assessing the causes. Furthermore, results indicate that the vast majority, N=288 (96%), of the respondents had knowledge about the COVID-19 mode of spread, about N=288 (96%) indicate their awareness as a highly contagious disease, about N=281(93.7%) respondents found aware of the potentially fatal risks associated with COVID-19, while, N=288 (96%) showed knowledge about the symptoms of COVID-19 and about N=270 (90%) among students demonstrated that they held no misconception of COVID-19 (see table 3).

Table 3: Showing results about knowledge about COVID-19 disease

Knowledge Questions	YES(F)	YES-(%)	NO(F)	NO (%)	Frequency	Percent
1 Do you Know that COVID-19 is an infectious disease	288	96*	12	4	288	96.0
2 Do you Know that COVID-19 is Zoonotic Pathogen Virus Which Can Spread from Animals to Human through Contacts	223	74.3*	77	25.7	223	74.3
3 Do you Know that COVID-19 Could Spread through Cough, and Sneezes or from touching object that has been contaminated with the Virus	294	98*	6	2	294	98.0
4 Do you Know that they are risk if you recently travelled from all resident in area with an ongoing spread of COVID-19 as determined by WHO	281	93.7*	19	6.3	281	93.7
5 Do you Know that they are risk if you had close contact with someone who has COVID-19 Virus such as classmate?	260	86.7*	40	13.3	260	86.7
6 Do you Know that they are risk if you had close contact with someone who has COVID-19 Virus such as teachers and anyone who have been taking care of the infected person	260	86.7*	40	13.3	260	86.7
7 Do you Know that they are risk to anyone who has chronical underlying healthy conditions like diabetes, high blood pressure, heart and lung diseases	249	83*	51	17	249	83.0
8 Do You know this Symptom of COVID-19-Fever	288	96*	12	4	288	96.0
9 Do You know this Symptom of COVID-19-Cough	288	96*	12	4	288	96.0
10 Do You know this Symptom of COVID-19-Difficulty in Breathing	287	95.7*	13	4.3	287	95.7
11 Do You know this Symptom of COVID-19-Tiredeness	266	88.7*	34	11.3	266	88.7
12 Do You know this Symptom of COVID-19-Running Nose	229	76.3*	71	23.7	229	76.3
13 Do You know this Symptom of COVID-19-Sore Throat	263	87.7*	37	12.3	263	87.7

Note: * indicates answers given above 50* which indicates good Knowledge

4.4 Misconceptions about COVID-19 disease control and preventative measures

While answering the questions asked to assess their misconception towards COVID-19, the results indicated that the majority had no misconception, as the results were also all above 50% answering Yes and No where necessary which was acting as a baseline with reference to world Health organisation guidelines as follows; N=217 (72%) the Virus can be killed on the sun, N=270 (90%) the Virus can be killed by drinking alcohol, N=240 (80%) the Virus cannot young people, N=246 (82%) the Virus cannot kill people with special genes and N=187(62.3%) that indeed the Virus can contaminate the atmosphere air (see table 4).

Table 4: Showing misconceptions results

Statement	YES(F)	YES-(%)	NO(F)	NO (%)
1 How do you think- COVID-19 can be killed by staying on the Sun	83	27.7	217	72.3*
2 How do you think- COVID-19 can be killed by drinking a lot of alcohol or beer	30	10	270*	90*
3 How do you think- COVID-19 cannot kill young people	60	20	240	80*
4 How do you think- COVID-19 cannot kill other people because they have special genes	54	18	246	82*
8 How do you think- COVID-19 can contaminate atmosphere air	187	62.3*	113	37.7

Note: * indicates answers given above 50%* which indicates good attitudes

4.5 Attitude and Perception towards COVID-19 disease control and preventative measures

Results about respondents' attitudes towards COVID-19 are illustrated in table 5. The results calculated above 50% which was set as the baseline of positive attitude. It shows that the majority of the respondents i.e. N=195 (65%) disagreed with the conception "COVID-19" is a punishment from God, while N=240 (80%) of them also stated that COVID-19 could be associated with any person. Furthermore, after being asked about their safety perceptions, the majority i.e. N=264 (80%) believed that it is safe to stay in China despite the outbreak.

Table 5: Showing attitudes of respondents

	Statement	YES(F)	YES- (%)	NO(F)	NO (%)
1	It was a punishment from God	105	35	195	65*
2	It was a disease associated with other people not me	60	20	240	80*
3	Do you still feel safe here in China after the outbreak of COVID-19	264	88*	36	12

Note: * indicates answers given above 50%* which indicates good attitudes

4.6 Practices of COVID-19 disease preventative measures

In table 6, preventive practices applying by respondents which were announced by the government or authorities are revealed. The results show that the majority of the respondents keenly following all the set of preventive practices as many scores were above 50% which was the baseline for practises to be followed in this study. Moreover, results indicate that N=100 (100%) respondents use obligatory face masks when doing outdoor activities, while, about N=256 (85.3%) did not allow visitors in their university dormitories. It is found that N=299 (99.7%) were washing their hands frequently and N=282 (94%) did not touch their faces with hands when they were dirty. The results indicate that N=287 (95.7%) avoided going out and kept a distance of 3 metres from anyone.

Table 6: Showing preventative practices by students

	Statement	YES(F)	YES- (%)	NO(F)	NO (%)
1	Wearing Mask when going out	300	100*	0	0
2	No visitors entertaining in dormitory	256	85.3*	44	14.7
3	Washing hands frequently with soaps	299	99.7*	1	0.3
4	Don't touching your face, eyes and nose when hands are dirty	282	94*	18	6
5	Don't go out if you're feeling sick or having any symptoms	287	95.7*	13	4.3
6	Keeping a distance of 3 feet away from anyone	287	95.7*	13	4.3

Note: * indicates answers given above 50%* which indicates good preventative practices

4.7 Univariate and Bivariate Analysis

4.7.1 Knowledge and practices scores

As it is revealed in methodology section that the questionnaire prepared had 13 questions for knowledge while, 5 for misconception, 3 for attitude and 6 for preventative practices section, each question used dummy variable as 1 score and 0 as, 1 for individual with good knowledge and 0 for individual with poor knowledge, score =1 for individual not misconception, and 0 for individual misconception, total knowledge scores = all knowledge + all not misconception, for attitude score = 1 for good attitude and 0 for negative attitude, and lastly for preventative practices score = 1 for good preventative practices and 0 for bad practices. Correlation between knowledge and practice score found insignificant.

On the distribution of knowledge and practices scores the results reveal that the mean knowledge scores vary significantly across age group ($P < 0.01$) and major of study ($P = 0.025$), while the mean scores of the practices varies significantly between major of study ($P = 0.015$) and experience ($P < 0.01$) while there are no significance variations in attitude means scores (see table 7).

Table 7: Distribution of knowledge and preventive practice scores among international students in China

Characteristics	Knowledge score	SD	F value	P value	Attitude score	SD	F value	P value	Practice score	SD	F value	P value
Gender												
Male	15.23	2.27	1.24	.267	2.33	0.66	.07	.093	7.61	0.68	2.67	.103
Female	14.94	2.25			2.33	0.72			7.46	0.87		
Age group												
<20	13.63±3.82		5.67	.004**	2.47	0.51			7.42		0.63	.536
20-30	15.12	2.11			2.31	0.71	.57	.566	7.55	0.77		
30+	15.91	1.68			2.39	0.58			7.39	0.99		
Marital status												
Single	15.01	2.30	2.11	.123	2.32	0.68			7.51	0.80	.671	.512
Married	16.17	1.02			2.41	0.90			7.67	0.49		
Divorced							.203`	.816				
Others	15.89	1.69			2.22	0.83			7.78	0.44		
Level of program												
Undergraduate	14.97	2.27	3.051	.082	2.34	0.65			7.51	0.76	.221	.639
Postgraduate	15.52	2.16			2.20	0.83	.328	.567	7.57	0.86		
Major												
Medical	15.28	2.06	2.832	.025**	2.31	0.67			7.48	0.78	3.128	.015**
Engineering	14.56	2.54			2.41	0.67			7.74	0.56		
Agriculture	15.81	1.86			2.24	0.88	.412	.796	7.76	0.43		
Business	15.38	2.56			2.26	0.67			7.19			
Others	14.18	2.38			2.36	0.72			7.45	1.05		
Experience												
<1	15.16	2.29	1.643	.195	2.47	0.68			7.84	0.37	5.733	.004**
1-2	15.57	2.40			2.25	0.62	1.65	.195	7.47	0.75		
2+	14.93	2.21			2.30	0.70			7.45	0.86		
Religion												
Islam	14.83	2.56	2.124	.063	2.25	0.65			7.64	0.61	1.397	.225
Christian	15.44	1.96			2.34	0.69			7.43	0.93		
Buddhist	14.00	1.26			2.50	0.54	1.152	.333	7.67	0.52		
Hindu	13.75	2.06			2.25	0.50			7.50	0.58		
Don't want to disclose	14.32	2.66			2.63	0.68			7.73	0.45		
Others	14.80	1.30			2.20	0.44			7.20	0.44		

Note: * indicates the statistic is significant at the 0.1 level and ** indicates significant at the 0.05 level, SD = Standard Deviation

According to the linear regression analysis, after converting the independent variables into binary form, the results show that age group of <20 (vs. Other converts, $\beta = -1.635$; $P < 0.01$), major convert 2 of Engineering (vs. other converts $\beta = -0.956$; $P < 0.01$), major convert 5 of others (vs. other converts, $\beta = -1.200$; $P = 0.018$) and religion convert 1 of Islam (vs. other convert 2 of Christianity, $\beta = -0.559$; $P = 0.040$) are significantly associated with lower knowledge score. On the other hand, major convert 2 of Engineering (vs. other converts, $\beta = 0.265$; $P = 0.012$), Experience Convert 1 of <1 (vs. other converts, $\beta = 0.449$; $P < 0.01$) and religion convert 1 of Islam (vs. other converts, $\beta = 0.248$; $P < 0.01$) are significantly associated with high practice scores (see table, 8 and 9).

Table 8: linear regression model output obtained using the backward likelihood ratio method for knowledge scores

Convert		Std. Error	t	Sig.
Intercept	15.586	.206	75.690	.000
Age First Convert (<20)	-1.635	.526	-3.108	.002*
Age Third Convert (30+)	.831	.482	1.723	.086
Marital Converted 4 (Others)	1.244	.747	1.667	.097
Major Converted2 (Engin.)	-.956	.306	-3.119	.002*
Major Converted 5(other)	-1.200	.503	-2.385	.018**
Experience Converted 2(1-2)	.570	.335	1.704	.089
Religion Converted1 (Islam)	-.559	.270	-2.067	.040**
Religion Converted 4(Buddhi)	-1.836	1.096	-1.674	.095
Religion Converted5(D.W.D)	-.959	.526	-1.824	.069

Table 9: linear regression model output obtained using the backward likelihood ratio method for practice scores

Convert		Std. Error	t	Sig.
Intercept	7.271	.068	106.856	.000
Major Converted 2(Engin.)	.265	.105	2.530	.012*
Experience Converted 1(<1)	.449	.113	3.979	.000*
Religion Converted1 (Islam)	.248	.093	2.669	.008*
Religion Converted5(D.W.D)	.345	.185	1.865	.063

Note: * indicates the statistic is significant at the 0.1 level and ** indicates significant at the 0.05 level

4.8 Relationships between dependent variables

In table 10, results of the Pearson correlation are revealed and it shows that there is a positive correlation between attitude mean scores and preventative practice mean scores of COVID-19 ($r=0.219$, $P < 0.01$), which simply illustrates that the higher and positive attitude, the higher the better preventative practices and the lower the good attitude indicate the lower the preventative practice of COVID-19 respectively. This simply illustrates that the possession of positive attitude would definitely increase the preventative practices of COVID-19 which fulfil the hypothesis of the study.

Table 10: Relationships between attitude, knowledge and preventative practices of COVID-19

Depended Variable		Knowledge scores	Attitude Scores	Practice Scores
Knowledge Score	Pearson Correlation	1	.014	.048
	Sig. (2-tailed)		.803	.403
	N	300	300	300
Attitude Score	Pearson Correlation	.014	1	.219
	Sig. (2-tailed)	.803		.000**
	N	300	300	300
Practice Score	Pearson Correlation	.048	.219	1
	Sig. (2-tailed)	.403	.000**	
	N	300	300	300

**Correlation is significant at the 0.01 level (2-tailed).

5. Discussion

The present study illustrates through the social demographic characteristics that it had almost equal gender participation, female 51% with only 1% percentage high as compared to 49% female. However, we cannot conclude that there is a growing participation of the male in social science studies with the reason that the presence of the male students at the time of the survey was more, as many studies on similar topic have proved to have many female participation with a huge gap of leading as compared to the one found in our study (7,35,36). Furthermore, it is found that the majority of international students were young, single and they were doing either medicine or engineering-related programmes, something that mainly contributed to their protracted stay of more than 2 years as many of these courses are up to five years before graduating. About studying in China, there are a lot of reasons behind the attraction of the two aforementioned courses, main of which was that many Chinese universities are highly equipped with the state of the art technologies aptly positioned to provide the best training in the medical and engineering courses and also the affordability of academic expenses in China as compared to other countries(37). The presence of many students of age group of 20 years below in universities is also a good indication that the youth are able to attain higher level of academics while at tender age. Furthermore, the research also revealed that many

international students belonged to religious affiliations with Christianity and Islam being the two major religious groupings with a lot of member affiliates, this simply indicates that many international students despite being in foreign land they were able to express their religion affiliation.

Throughout their academic studies, scholars have laid emphasis on the fact that knowledge is exceedingly important as it has a direct bearing on the attitude that people form towards something (15,36,38). The findings of the study corroborated the foreboding fact and further found out that international students had enough and adequate information which positively increased their good knowledge regarding the causes, spread and symptoms of the COVID-19 with having high scores of up to 98%. However, the results indicated that there was a significant mean score difference between age groups with ($P < 0.01$) of which the group of < 20 years had low mean scores as compared to other groups and major of study ($P = 0.015$) where those in engineering majors and other studies had low mean scores as compared to medical and agriculture majors. These noted knowledge gaps arose primarily because medical and agricultural majors students might have had biological sciences knowledge which is linked to infectious and virus diseases prior to the pandemics as it might also be in their curriculum of study and is related to their professions which would have positively gave them an added advantage of having good knowledge. The general findings of good knowledge on the COVID-19 of this study are in agreement with other results that were conducted on similar topics on COVID-19 in other countries like China, India, Bangladesh and Turkey (15,27,28,36) recently. Furthermore, on knowledge gaps the study is in conformity with results in other areas where pandemics like Cholera, Ebola, Avian Influenza (H5N1), N1H1[8] Flu Virus and COVID-19 knowledge were researched like Thailand and Nigeria where they also found that they were knowledge gaps among people depending on social demographic factors like academic background, sex, age (1,35). This good Knowledge among international students could be attributed to the fact of ICT[9] development and the nature of COVID-19 because it had been the news that anyone talked about day in day out because of the utterly devastating of its impact that the pandemic had on every aspect of human life. Despite this, it still differs with other study on pandemics like Cholera conducted in Bangladesh where they found out that many people had poor knowledge of Cholera (21), this improvement on knowledge gaps can be further be explained due to the devastating impacts that COVID-19 has brought which is evidenced in everyday, especially those social distance measures like lockdowns has really made its awareness to go viral (12).

ICT has proved to be contributing immensely to all the sectors development through the way and speed information could be transferred from one person to another. The study found a similar pattern and revealed that internet through social media platforms was the main source of information for the international students used to know about COVID-19, seconded by the school notifications which universities in China usually issued to apprise them of COVID-19 updates either weekly or monthly depending on the need of the institutions. The advance in technology was credited with profoundly changing the way people got access to vital information because previously researches on pandemics had more scores on TV, Radios and friends as channels of source of information (27). It was therefore not surprising that the majority of the international students did not have misconception on truth and reality of the facts regarding COVID-19 because they had all the necessary information from internet and school notifications which were accurate and were timely provided as well.

Attitude towards pandemics had not been constant among different people depending on many social demographic factors. However, the study found that many international students had a positive attitude towards COVID-19 and that, despite the majority of them being religious, they also believed and perceived that COVID-19 was not a punishment from God, a clear contrast on other studies on pandemics like HIV/AIDs that found out that many people regarded pandemics as signs of punishments from God due to the sins that people had committed (1,35,39). However, the results were in agreement with recent studies done China and India where they also found that many people had positive attitude towards the COVID-19 and Cholera believed that they would fight and win anytime (15,27). With regard to their views on safety, international students confidently indicated that they felt safe being in China despite the outbreak of COVID-19 which was also attributed to the measures that the authorities implemented to make sure foreigners in living in China including students were guaranteed of their safety (30). It therefore indicated that international students saw COVID-19 as a global pandemic infectious disease that was normal like any other pandemics which was supposed to be taken with all human collaboration without looking at where it came from or associating it with a certain group of people.

In regards to preventative practices towards COVID-19, almost all of the international students regardless of their gender demonstrated that they were keeping the good preventative practices of the COVID-19 like wearing masks when going out, not allowing visitors in their dormitory etc, this could be due to the reasons that they really understand the importance of the practising them but also we could not rule out that facts that some could be fearing punishments from the schools and other authorities under their universities and location. However, it was found in this study that there were significant variations between major of study and experience having lower mean scores towards preventative practices of COVID-19 the reasons could be those in lower age group (< 20) not being in a good number in China and that those that had more than 2 years stay feeling not scared because of their experience of staying in China. It was clear then that many people practised good practises of pandemics in many countries due to the negative consequences that they saw when they failed to conform to good practises as a results many studies too are in agreement with this research that a lot of people practise the preventive and control practices given by their authorities (8,28,36).

Furthermore, this study found out that there was a positive correlation between attitude and adherence to preventative practices against COVID-19, which indicated that if people possessed good attitudes towards pandemics like COVID-19 they were more likely to conform to all the preventive measures against COVID-19. However, there was no significant relationship between knowledge and attitude and practices which differs with other studies which were conducted on the same topic and other topic(15,36) this differences could have risen due to other limitations that the study had undergone.

This study had also the following limitations, firstly, coming up with a good sample size, when this study was conducted it was a time when schools were closed and some students were on holiday, especially those that are from countries that surround China like Asians continents whose their

students usually go home for holiday, secondly, some students from other continents were evacuated back to their countries by their respective embassies. However, this study was aimed at only targeting those students that were still in China at that time and were experience the COVID-19 and not those that were at home, as such coming up with the actual sample size was a limitation because the exact number of student population left was not clearly known due to the situation itself and the researcher used 2019 MOE data plus other assumptions to try to come up with the population remained in China. Also, many students were unwilling to fill and send the questionnaires as many were tired of COVID-19 related issues. On the other hand , this study did not receive any special funding to foster some of the activities that would need funds like motivating the people that were identified as leaders to help in collecting data in their respective universities, this was a difficult task as it was all seen as a voluntary work without any motivation.

6. Conclusion

The pandemic COVID-19 wrought indescribable damage to all sectors of development and disrupted many activities including education at the globally. For instance, it is found that due to COVID-19, students all over the world are unable to attend their classes physically. International students in China where COVID-19 emerged showed that they had all the vital knowledge of the deadly virus. These students stated that internet and school notifications provided at their respective colleges and universities as their primary sources of information about the pandemic. Many students found positive attitudes towards COVID-19 and perceived themselves to be so much safe being in China in the midst of COVID-19 and that the majority of them followed all the required preventative practices. Fighting against COVID-19 is required all-out efforts of everyone like international students in China also demonstrated their zeal to help in the fight against the pandemic by adhering to all the necessary preventative measures put in place in order to reduce the spread of COVID-19.

Footnotes

¹Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome (HIV/AIDS)

² Severe Acute Respiratory Syndrome

³ World Health Organization

⁴ Knowledge, Attitudes and Preventative Practices

⁵Foreign students and international students as migrants and students belong to minority special social status group that is also venerable and need to be protected

⁶Ministry of Education in China

⁷International student office

⁸ Hemagglutinin Type1 and Neuraminidase Type1

⁹ Information Communication Technology

Declarations

Availability of data and materials

All data and other materials are included in the manuscript but if anything, apart from the available in the manuscript can be requested from the authors.

Competing Interest

The authors declare that they have no competing interests.

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CRedit authorship contribution statement

Wu Xuelian: Conceptualising the framework, questionnaire design and final corrections, George Chidimbah Munthali: Writing, data analysis and interpretation. All authors have read and approved the manuscript”, and ensure that this is the case.

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Figures

Relationship between variables

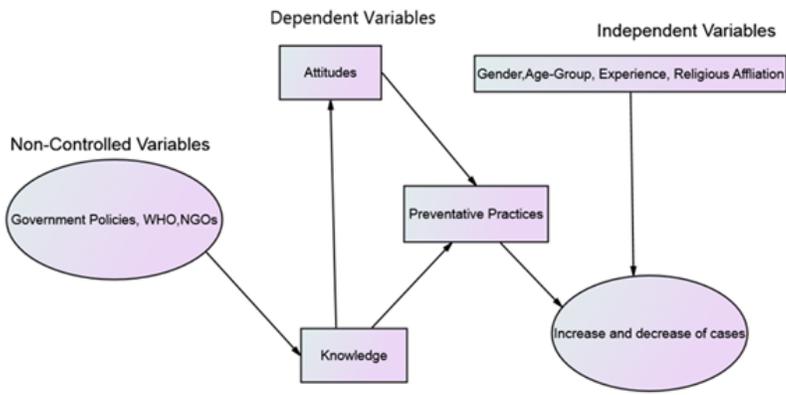


Figure 1

Relationship between different variables in the study.