

Knowledge, attitudes, and practices (KAP) towards COVID-19: A Cross-sectional Online Survey among residence of Nagaland and neighboring states

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<https://doi.org/jxu/11.7/067>

Abstract:

The Novel Coronavirus disease 2019 (abbreviated "COVID19") suddenly appeared pandemic, which jeopardized global health worldwide and for which no country was prepared to face leading to a social emergency that requires unprecedented measures to control the rapid spread of the pandemic. Along with the globe, Indian residents' happened to face similar unprecedented situations arise due to the pandemic. Since there is no available vaccine or definite medicine for the pandemic, adherence to control measures is only the present solution to avoid the mass spread. The adherence to control measures is affected by the residents' Knowledge, Attitudes, and Practices (KAP) towards the disease, therefore. This study was conducted to investigate Knowledge, Attitude, and Practices towards COVID-19 among residents of the state of Nagaland and the neighboring states of North-East of India during the pandemic period in the month of May 2020 through an online survey of 1756 respondent.

The aim of this study is to assess the KAP of COVID-19 pandemic among the residents of the state of Nagaland and the neighboring states of North-East of India on demographic variables viz. gender, age, marital status, education, occupation, religion, and place of stay. Methods of the study adopted are cross-sectional online survey on KAP. The collected simple descriptive description was made of complex multivariate analyzes using SPSS 17.

Findings will help government of Nagaland along with the neighboring states in particular and throughout the affected countries across the world in general to understand human psychology during the pandemic and act, plan safety measures, educate etc. to targeted population accordingly on the pandemic.

Keywords: Knowledge; Attitude; Practice; COVID-19; Nagaland; India.

1. INTRODUCTION

Coronavirus disease 2019 (abbreviated "COVID-19") is a global public health threat that creates a pandemic situation worldwide. This continuing threat is caused by a virus, severe acute respiratory syndrome, coronavirus 2 (SARS-CoV-2) [1]. The origin of COVID-19 is considered to be in Wuhan, China, where the first case was reported in December 2019 [2]. WHO's situation report for 30 January reported 7818 total confirmed cases worldwide, with the majority of these in China, and 82 cases reported in 18 countries outside China; gave a risk assessment of very high for China, and high at the global level. In response to this dire situation, COVID-19 declared a public health emergency of international concern by the World Health Organization (WHO) on 30th January 2020, called for collaborative efforts by all countries to prevent the rapid spread of COVID-19 [3]. This COVID -19 epidemic has spread very rapidly, and by 16th May 2020, more than 4.39 million cases have been reported in nearly 216 countries, areas, or territories, resulting in more than 300,441 deaths [4].

India reported the first confirmed case of COVID-19 infection on 30th January 2020 in the state of Kerala who has a history of travel from Wuhan, China. Data from the Ministry of Health and Worldometer, a website that records confirmed cases of infection and deaths worldwide, said that in India coronavirus cases doubled from 500 to 1,000 in five days and then took four days to reach 2,000. Coronavirus cases in the country took just three days to double and reach the 4,000 marks, but six days for the count to reach 8,000. Then the doubling rate was eight days when the account reached 16,000 and 10 days when it reached the 32,000 marks [5].

By 2nd June 2020 India with a positive case of 190535, with doubling time of 14 days holding the 7th position in the world after United States (1790191); Brazil (514849); Russia (405843); United Kingdom (276156); Spain (239479); Italy

(232997) positive cases (Source: World Health Organization, 2nd June 2020). India has low cases per million people (117 cases per million people), compared to the United States (5197 cases per million people) or Italy (3825 cases per million people). However, India is also testing far less than any of these countries. The United States is testing 19 times and Italy is testing 25 times more than India [6, 7].

Nagaland is officially the last of the north-eastern states after Sikkim to report three positive cases of COVID-19 on 25th May 2020 along with the arrival of the stranded resident of Nagaland from Chennai on Friday evening, 22nd May 2020. However, a 33-year-old merchant based in Dimapur had tested positive at Guwahati Medical College and Hospital (GMCH) on April 12. The man had been admitted to a private hospital in Dimapur for treatment, but the hospital referred him to GMCH since the State had no testing facilities at the time. The Nagaland Department of Health and Family Welfare did not include him on the State's list of positive cases. The department's update said it had been "added to the Assam state account since the sampling was done in Assam." [8]

Between May 16 and May 25, the number of people infected by one Covid-19 patient on average –known as the effective reproduction rate (R) of the disease was 1.23, down from 1.29 between April 13 and May 4 and from 1.83 between March 4 and April 11, according to calculations by Sitabhra Sinha, a professor at the Institute of Mathematical Sciences in Chennai [9].

The fatality rate (percentage of deaths from detected cases) of 3%, India has a lower case fatality rate than Spain, Belgium, the United States, and Mexico, However, (Source: Ministry of Health, 30th May 2020) more than 100 countries in total and eight countries in the top 20 (including Russia, Turkey, Saudi Arabia, and Pakistan) have a lower case mortality rate than India [10].

COVID-19 has overcome geographical barriers achieving a remarkable proliferation. Due to this, different countries initiate public health protocols to control the spread of viruses, many of them related to social distancing, hand washing, and the lockdown of cities[11]. Various reactions have emerged among the population due to this critical condition, creating mass anguish and fear [12]. Also, it should be noted that the concern is mainly present in the unaffected population.

Knowledge and awareness of the disease is an important cognitive key in public health concerning health and safe self from the virus. It involves a variety of beliefs about the causes of the disease and exacerbating factors, identification of symptoms, and available methods of treatment and consequences [13]. Beliefs about COVID-19 come from

different sources, such as stereotypes about similar viral diseases, government information, networks social and internet, previous personal experiences, and medical sources. The precision of these beliefs can determine different prevention behaviors and could vary in the population. In many cases, lack of knowledge, or whether most of these medicine-related beliefs are truly false, may have a potential risk factor [14].

Many studies the COVID-19 concluded that knowledge, attitude, and practice of the resident of a place are highly associated with the spread of the virus. Higher the level of information and education was associated with more positive attitudes towards COVID-19 preventive practices. Risk perception is also a key factor in commitment to prevention during outbreaks of a global pandemic [15].

2. MATERIALS AND METHODS

2.1 Study Design and Sample:

To assess KAP about COVID-19 among the Nagaland respondent and neighboring states a convenience sample from 1756 respondents has been collected and divided between the demographic variables viz. gender, age, marital status, education, occupation, religion, and place of stay.

2.2 Objective and Hypothesis:

Knowledge, Attitude, and Practice on COVID 19 on demographic variables viz. gender, age, marital status, education, occupation, religion, and place of stay analyzed.

It is assumed that there is no significant difference in Knowledge, Attitude, and Practice on COVID 19, concerning their demographic variables of the targeted population.

2.3 Measures:

The questionnaire consisted of two parts: demographics and KAP. Demographic variables included gender, age, marital status, education, occupation, religion, state, and place of stay

The tool used for the study is standardized KAP used for online surveys and developed by Bao-Liang Zhong and associates which is used for a similar study in China [15]. The survey tool has three parts COVID-19 knowledge consisting of 12 items of which: 4 regarding clinical presentations (K1-K4), 3 regarding transmission routes (K5-K7), and 5 regarding prevention and control (K8-K12) of COVID-19. The scale used is 3, 2, and 1 for 'Agree', 'Don't know' and 'Disagree' respectively for positive statements and vice versa. Nearing score to '3' indicating higher-order and nearing to '1' indicating poor order condition. The second part is on Attitude towards the COVID-19, and the third part is on practices on COVID-19

consisting of two items each where for 'Yes' and 'No' options '2' and '1' are respectively used for positive statements and vice versa. The total knowledge score ranged from 0 to 12, with a higher score denoting a better knowledge of COVID-19. The Cronbach's alpha coefficients of the knowledge items are 0.71 in the sample, indicating acceptable internal consistency [16].

2.4 Statistical analysis:

The frequencies of correct knowledge responses and various attitudes and practices were described. Scores, attitudes, and practices of different people according to demographics variables viz. gender, age, marital status, education, occupation, religion, and place of stay are analyzed. The demographic variables are compared with the independent samples t-test, one-way analysis of variance (ANOVA), and Chi-square test (at 95% confidence level and level of statistical significance established at $p < 0.05$, two-sided) according to the suitability of data. Coefficient of correlation calculated using all demographic variables as independent variables to study the relationship that exists. Effective of KAP over demographic variables are analyzed using Odds ratios (OR). Data analyzes were performed with SPSS - 17.0 version.

3. RESULTS

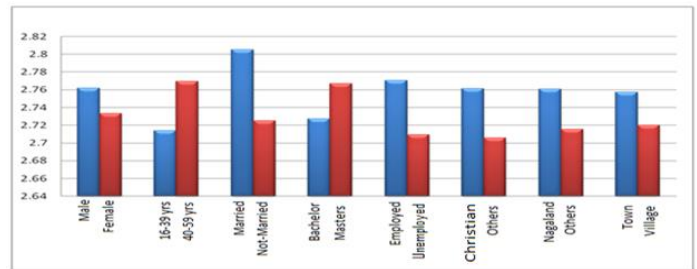
3.1 Social and Demographic Characteristics:

Of the total 1756 participants, 1176 (76.02%) respondent from the state of Nagaland and remaining 371 (23.98%) from the neighboring states of North-East of India has participated in the online survey. Here, analysis has been done on KAP systematically. From the Knowledge factor **Table 1** shows the social and demographic characteristics of the participants. On Knowledge of COVID 19, overall mean score 2.75 (SD = 0.228; Range: 2.21 – 2.97). Across gender, married women of 532 (38.78%) reflects highest knowledge Mean score of 2.80 (SD=0.1724; Range : 2.08 – 3.00); other religion (includes Hindu, Muslim, Jain etc) of 315 (20.64%) reflects poor knowledge Mean score of 2.71 (SD = 0.2109; Range: 2.00 – 3.00).

Table 1: Social and Demographic Characteristics

Demographic Variables	Number of participants	%	Knowledge score (mean \pm standard deviation)	Range
Gender	Female	847	54.02 \pm 0.2199	2.25 - 3.00
	Male	721	45.98 \pm 0.1549	2.00 - 3.00
Age-group (years)	16 - 29	616	40.55 \pm 0.1741	2.00 - 3.00
	30 - 49	840	59.45 \pm 0.193	2.00 - 3.00
Marital status	Married	532	38.78 \pm 0.1724	2.08 - 3.00
	Unmarried	840	61.22 \pm 0.1810	2.00 - 3.00
Education	Bachelor's	448	29.25 \pm 0.2024	2.00 - 3.00
	Master's	1050	70.75 \pm 0.1716	2.08 - 3.00
Occupation	Employed	994	71.36 \pm 0.1857	2.08 - 3.00
	Unemployed	399	28.64 \pm 0.1999	2.00 - 3.00
Religion	Christian	1211	79.36 \pm 0.1763	2.00 - 3.00
	Others	315	20.64 \pm 0.2109	2.00 - 3.00
State	Nagaland	1176	76.02 \pm 0.1783	2.00 - 3.00
	Others	371	23.98 \pm 0.2051	2.00 - 3.00
Stay palce	Town	1197	76.34 \pm 0.1741	2.08 - 3.00
	Village	371	23.66 \pm 0.2259	2.00 - 3.00
Overall		1756	100 \pm 0.2286	2.21 - 2.97

Graph 1: Knowledge Mean score on COVID 19



Note: Other than Christian includes, Hindus, Muslims, Jain etc & Other States includes Neighboring north-east states, Assam, Meghalaya, Tripura, Arunachal Pradesh, Manipur

Referring **Table 2**, the Knowledge scores on COVID 19, statistically significant across ages (16 – 39 yrs and 30- 49 yrs), Marital status (Married and Unmarried), and Occupation (Employed and Unemployed) at $P < 0.05$. Statistically not significant across Gender (male vs. female); Education (Bachelor's degree vs. Master's degree and above); Religion (Christian vs. Others), State (Nagaland vs. Other State) and Place of stay (Town vs. Village) with respect to Knowledge scores on COVID 19.

Coefficient of correlation analysis showed that Gender (male vs. female) is 0.9670; Age-group (16-29 vs.30-49 years) is 0.8882; Marital status (married vs. never-married) is 0.9545; Education (Bachelor's degree vs. Master's degree and above) is 0.9719; Occupation (employed vs. unemployed) is 0.8318 Religion (Christian vs. Others) is 0.7995; State (Nagaland vs. Other State) is 0.7910 and Place of stay (Town vs. Village) is 0.9342 reflecting a positive correlation between the variables with respect to the knowledge on COVID 19 pandemic. Among those, it reflects the maximum correlation between Education (Bachelor's degree vs. Master's degree and above) and the least correlation between States (Nagaland vs. Other State).

Table 2 : Statistical significance of Knowledge score

Variable	Correlation Coefficients	SEM	t	p	Remarks
Gender (male vs. female)	0.9670	0.01408; 0.02167	1.1927	0.2343	Not Statically Significant
Age-group (16-29 vs. 30-49 years)	0.8882	0.01856; 0.01697	2.3402*	0.0202	Statically Significant*
Marital status (married vs. never-married)	0.9545	0.01978; 0.01652	2.6868*	0.0078	Statically Significant*
Education (bachelor's degree vs. master's degree and above)	0.9719	0.02514; 0.01401	1.4744	0.1419	Not Statically Significant
Occupation (employed vs. unemployed)	0.8318	0.01559; 0.02648	2.0154*	0.0452	Statically Significant*
Religion (Christian vs. Others)	0.7995	0.01340; 0.03262	1.6085	0.1092	Not Statically Significant
State (Nagaland vs. Other State)	0.7910	0.01375; 0.02817	1.3725	0.1713	Not Statically Significant
Place of stay (Town vs. village)	0.9342	0.01331; 0.03103	1.357	0.1762	Not Statically Significant
* at 0.05 level of Significance					

3.2 Attitude towards COVID 19:

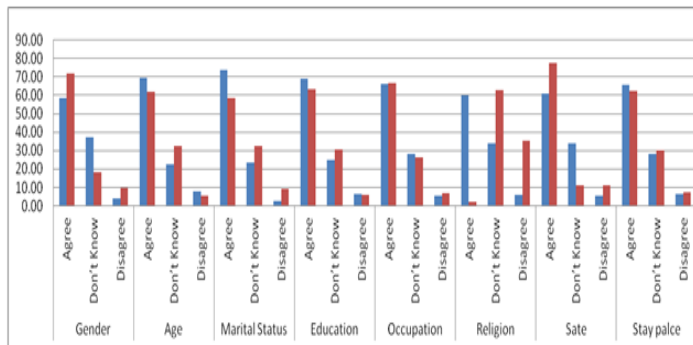
The majority of the respondents agreed that COVID-19 will finally be successfully controlled by 1137 (64.73%). Rates of reporting "Don't know" and "disagree" are 502 (28.57%) and 118 (6.70%) respectively. In respect to Confidence in overcoming COVID 19, majority of the respondent 1309

(74.55%) reflects the positive attitude and 447 (25.45%) of respondent have reflected no confidence in winning the battle against the COVID-19 virus (Table 3).

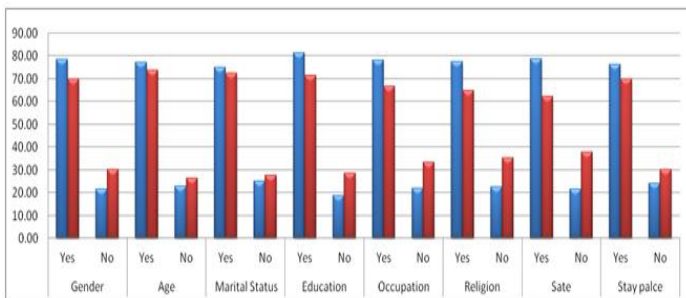
Table 3: Attitude towards COVID 19

Characteristics		Number of respondent (%)				
		A1: Final success in controlling			A2: Confidence in overcoming COVID 19	
		Agree	Don't know	Disagree	Yes	No
Gender	Female	497(58.68)	315(37.19)	35(4.13)	665(78.51)	182(21.49)
	Male	518(71.84)	133(18.45)	70(9.71)	504(69.90)	217(30.10)
Age-group (years)	16 - 39	427(69.32)	140(22.73)	49(7.95)	476(77.27)	140(22.73)
	30-49	521(62.02)	324(32.56)	46(5.43)	619(73.69)	221(26.31)
Marital status	Married	392(73.68)	126(23.68)	14(2.64)	399(75.00)	133(25.00)
	Not-married	490(58.33)	273(32.50)	77(9.17)	609(72.50)	231(27.50)
Education	Bachelor's	308(68.75)	112(25.00)	28(6.25)	336(75.00)	112(25.00)
	Master's	658(63.33)	322(30.67)	63(6.00)	761(73.48)	289(27.52)
Occupation	Employed	658(66.20)	280(28.17)	56(5.63)	777(78.17)	217(21.83)
	Unemployed	266(66.67)	105(26.32)	28(7.01)	266(66.67)	133(33.33)
Religion	Christian	728(60.12)	413(34.10)	70(5.78)	938(77.46)	273(22.54)
	Others	61(9.96)	198(62.75)	111(35.29)	204(64.76)	111(35.24)
State	Nagaland	714(60.71)	399(33.93)	63(5.36)	924(78.57)	252(21.43)
	Others	287(77.36)	42(11.32)	42(11.32)	231(62.26)	140(37.74)
Stay palce	Town	784(65.50)	336(28.07)	77(6.43)	910(76.02)	287(23.98)
	Village	231(62.26)	112(30.19)	28(7.55)	259(69.81)	112(30.19)
Overall		Out of 1756	1137(64.73%)	502(28.57%)	118(6.70%)	1309(74.55%)

Graph 2: Percentage Bar Chart on Successfully control over COVID 19



Graph 3: Percentage Bar Chart on confidence in winning the battle against the COVID 19



The attitude between agreeing and disagreeing in the final success in controlling COVID-19 is significantly different across Marital status (Married vs. Unmarried, OR= 4.400; $p < 0.05$) and Religion (Christian vs. Others, OR=187.200, $p < 0.00001$). The attitude between agreeing and not knowing in

the final success in controlling COVID-19 are significantly different across Gender (Female vs. Male, OR= 0.4051; $p < 0.05$); Religion (Christian vs. Others, OR=56.4068, $p < 0.00001$) and State (Nagaland vs. Neighboring states, OR=0.26187, $p < 0.05$). With respect to no confidence in winning the fight against COVID 19 only significantly different is across State (Nagaland vs. Neighboring states, OR=2.223, $p < 0.05$) (Table 4).

Table 4: Statistical Significance on Attitude in Controlling COVID-19

Variable	OR	χ^2	p-value	Remarks
A1: Agree to success over COVID 19 (vs. Disagree)				
Gender (female vs. male)	1.9189	1.3321	0.24844	Not Significant
Age-group (16-29 vs. 30-49 years)	0.7625	0.2348	0.62800	Not Significant
Marital status (Married vs. unmmried)	4.4000	4.0926	0.04371	Significant*
Education (bachelor's degree vs. Masters)	1.0421	0.0043	0.94763	Not Significant
Occupation (Employed vs. Students)	1.2368	0.1100	0.74014	Not Significant
Religion (Christian vs Others)	187.200	72.4111	<0.00001	Significant*
State(Nagaland vs Others)	1.6585	0.8337	0.36120	Not Significant
Residence place (Town vs Village)	1.2342	0.1168	0.73254	Not Significant
Agree about final success (vs. Don't know)				
Gender (female vs. male)	0.4051	8.1927	0.00421	Significant*
Age-group (16-29 vs. 30-49 years)	1.6013	2.1747	0.14030	Not Significant
Marital status (Married vs. unmmried)	1.7333	2.6971	0.10053	Not Significant
Education (bachelor's degree vs. Masters)	1.3316	0.7003	0.40269	Not Significant
Occupation (Employed vs. Unemployed)	0.9276	0.0439	0.83407	Not Significant
Religion (Christian vs Others)	56.4068	40.7524	<0.00001	Significant*
State(Nagaland vs Others)	0.26187	9.1049	0.0025	Significant*
Residence place (Town vs Village)	1.1313	0.1243	0.72444	Not Significant
A2: No confidence of winning				
Gender (female vs. male)	1.5732	2.1739	0.14037	Not Significant
Age-group (16-29 vs. 30-49 years)	1.2168	0.3686	0.54375	Not Significant
Marital status (Married vs. unmmried)	1.1379	0.1492	0.69930	Not Significant
Education (bachelor's degree vs. Masters)	1.7414	2.3102	0.12852	Not Significant
Occupation (Employed vs. Unemployed)	1.7903	2.8604	0.09078	Not Significant
Religion (Christian vs Others)	1.8741	3.3756	0.06617	Not Significant
State(Nagaland vs Others)	2.2222	5.6633	0.01732	Significant*
Residence place (Town vs Village)	1.3711	0.8230	0.36430	Not Significant

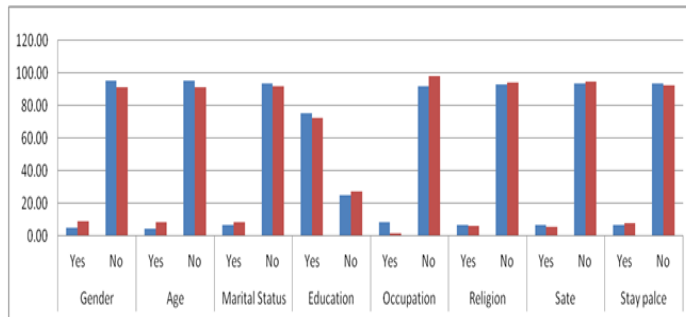
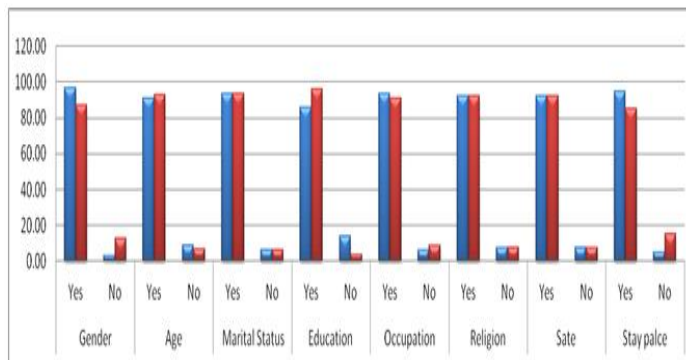
* Significance lelel at 0.05 level

3.3 Practices toward COVID 19

In respect of social practice, the majority of the respondents 1638 (93.30%) are not in the favor of going to a crowded place and the majority of the respondent 1623 (92.45%) express willingness towards putting a mask while going out in recent days. There is still a small respondent 118 (6.70%) and 133 (7.59%) expressed have visited crowded places and have not put masks when leaving home respectively (Table 5).

Table 5: Social practices during COVID 19 pandemic

Characteristics		Number of respondent (%)			
		P1: Gone to any crowded place		P2: Worn a mask when leaving home	
		Yes	No	Yes	No
Gender	Female	42(4.96)	805(95.04)	819(96.69)	28(3.31)
	Male	63(8.74)	658(91.26)	630(87.38)	91(12.62)
Age-group (years)	16 - 29	28(4.55)	588(95.45)	560(90.91)	56(9.09)
	30 - 49	72(8.53)	768(91.47)	781(93.02)	59(6.98)
Marital status	Married	35(6.58)	497(93.42)	497(93.42)	35(6.58)
	Unmarried	70(8.33)	770(91.67)	784(93.33)	56(6.67)
Education	Bachelor's	35(7.81)	413(92.19)	336(75.00)	112(25.00)
	Master's	63(6.00)	987(94.00)	761(72.50)	289(27.50)
Occupation	Employed	84(8.45)	910(91.55)	931(93.66)	63(6.34)
	Unemployed	7(1.75)	392(98.25)	364(91.23)	35(8.77)
Religion	Christian	84(6.94)	1127(93.06)	1120(92.49)	91(7.51)
	Others	19(5.88)	296(94.12)	290(92.16)	25(7.84)
State	Nagaland	77(6.55)	1099(93.45)	1085(92.26)	91(7.74)
	Others	21(5.66)	350(94.34)	343(92.45)	28(7.55)
Stay place	Town	77(6.43)	1120(93.57)	1134(94.74)	63(5.26)
	Village	28(7.55)	343(92.45)	315(84.91)	56(15.09)
Overall	Out of 1756	118(6.70%)	1638(93.30%)	1623(92.45%)	133(7.55%)

Graph 4: Percentage Bar Chart on Social Practice with respect to visiting crowded place**Graph 5: Percentage Bar Chart on Social Practice with respect to wearing a mask**

In respect to Social Practice, going to crowded places, there is no evidence of significant differences found across all demographic variables. Whereas, putting a mask while going out of home across demographic variables across Gender (Female vs. Male, OR= 4.225; $p < 0.05$); Education (Bachelor's degree vs. Master's degree and above, OR= 1.1379; $p < 0.05$)

and Place of stay (Town vs. Village, OR= 3.2000; $p < 0.05$) found to be statistically significant (Table 6).

Table 6: Statistical Significance on Social Practices

Variable	OR	χ^2	p-value	Remarks
P1: going to a crowded place				
Gender (female vs. male)	0.5449	1.2718	0.25942	Not Significant
Age-group (16-29 vs. 30-49 years)	0.5108	1.2889	0.25624	Not Significant
Marital status (Married vs. unmarried)	0.7746	0.2026	0.65259	Not Significant
Education (bachelor's degree vs. Masters)	1.3277	0.2410	0.62345	Not Significant
Occupation (Employed vs. Unemployed)	5.1692	2.9870	0.08393	Not Significant
Religion (Christian vs. Others)	1.1925	0.0700	0.79127	Not Significant
State(Nagaland vs. Others)	1.1677	0.0535	0.81716	Not Significant
Stay place (Town vs. Village)	0.8422	0.0804	0.77672	Not Significant
P2: not wearing a mask				
Gender (female vs. male)	4.225	6.8845	0.008695	Significant*
Age-group (16-29 vs. 30-49 years)	0.7500	0.3238	0.56931	Not Significant
Marital status (Married vs. unmarried)	1.0143	0.0006	0.98082	Not Significant
Education (bachelor's degree vs. Masters)	1.1379	6.9687	0.00829	Significant*
Occupation (Employed vs. Unemployed)	1.4209	0.3684	0.54387	Not Significant
Religion (Christian vs. Others)	1.0475	0.0061	0.93791	Not Significant
State(Nagaland vs. Others)	0.9733	0.0021	0.96372	Not Significant
Stay place (Town vs. Village)	3.2000	5.5759	0.01821	Significant*

* Significance level at 0.05 level

4. DISCUSSION

Currently, the COVID-19 pandemic that suffers from both the number of cases and deaths is increasing worldwide. The number of newly infected people in Nagaland in particular and India in general increases as the days go by. Taking this outbreak into account, this study was conducted with the aim of measuring the level of knowledge, attitude, and practice of COVID-19 and perceptions about it among people in Bangladesh. The findings of this study may be helpful in planning health education programs for this emerging infectious disease in the near future.

Although the overall mean score on knowledge of COVID 19 is 2.75, closer to the maximum score of 3, which is encouraging for the state of Nagaland including neighboring states. This finding is consistent with other studies that have demonstrated satisfactory levels of knowledge, throughout the Nagaland including neighboring states, for the pandemic. In our study, the high rate of correct answers to knowledge-related questions among participants was not surprising as all of the respondents are with educational background and in touch with different social media, television, radio, newspaper, etc.

Across gender, married women of 532 (38.78%) reflects the highest knowledge Mean score of 2.80 (SD=0.1724; Range: 2.08 – 3.00) reflecting their portative nature towards the family and other family members [17, 18, 19] whereas the

other religious (Hindu, Muslim, Jain, etc) population mean score is 2.71 found to be least, which is a surprise finding in the present study. The Knowledge scores on COVID 19, statistically significant across ages (16 – 39 yrs and 30- 49 yrs); Marital status (Married and Unmarried) and Occupation (Employed and Unemployed) at $p < 0.05$ indicating that Unmarried and Unemployed resident of Nagaland and its neighboring states needs to develop more knowledge in COVID 19 pandemic [19].

It is worth mentioning that higher COVID-19 Knowledge scores are found to be significantly associated with a lower probability of negative attitudes and potentially dangerous practices toward the COVID-19 pandemic in this study. These findings indicate the importance of improving residents' knowledge of COVID-19 through health education, which can also result in improvements in their attitudes and practices towards COVID-19.

Although attitudes towards COVID-19 were optimistic, the attitude of the majority of the respondents agreed that COVID-19 will finally be successfully controlled 1137 (64.73%) and surprisingly only 1.96% of other religion residents' reflects their confidence on it which is the concern of the present situation and need to be addressed. The attitude between agreeing and disagreeing in the final success in controlling COVID-19 shows different attitudes among Married vs. Unmarried, Christian vs. Others and the attitude between agreeing and not knowing in the final success in controlling COVID-19 shows different Female vs. Male, Christian vs. Others, and Nagaland vs. Neighboring states. However, these results contrast with other findings that suggest people tend to express negative emotions, such as anxiety and panic, during a pandemic that could affect their attitude [20].

In respect of social practice, the majority of the respondents 1638 (93.30%) are not in the favor of going to a crowded place and the majority of the respondent 1623 (92.45%) express willingness towards putting a mask while going out in recent days. There is still a small respondent 118 (6.70%) and 133 (7.59%) expressed have visited crowded places and have not put masks when leaving home respectively. According to the WHO and the ICMR, New Delhi, every individual irrespective of the suffering of COVID 19 or not should wear a face mask when they are out of home [20, 21].

Health education intervention would be more effective if it targets certain demographic groups like students, unemployed, unmarried, and marginally educated individual of the society. Many studies found that every single individual in the society has to understand the protective measures and participate to fight against COVID 19 pandemic. Every affected person is the potential in infecting an average of 406 persons in 30 days

(ICMR, 7th April 2020) [22]. It will be foolishness in the part of the administration to ignore a single effected case or not maintain Standard Operating Photocell (SOP) published from time to time by the authorized bodies. It is evident to mention that, with respect to Social Practice, going to crowded places, there is no difference found across all demographic variables. Whereas, putting a mask while going out of home across demographic variables between Female vs. Male, Bachelor's degree vs. Master's degree and above, residents of Town vs. Village reflects their difference in their practices.

In summary, the finding of this study suggests that:

Nagaland, including the neighboring states of Nagaland residents of relatively high socioeconomic status, particularly women, have good knowledge, optimistic attitudes, and appropriate practices towards COVID-19 during the period of the rapid increase of the outbreak.

Furthermore, good knowledge of COVID-19 is associated with optimistic attitudes and appropriate practices towards COVID-19, suggesting that health education programs aimed at improving knowledge of COVID-19 are useful in fostering optimistic attitudes and maintaining safe practices.

The resident and administrator should understand the importance of Standard Operating Photocell (SOP) published from time to time by the authorized bodies and should abide by it.

Student, Unemployed, people from lower social order should be taken extra care according to their perspectives to educate on COVID 19.

Stranded home comers should be taken extra care for maintaining SOP.

More Biosafety Level 3 (BSL-3) laboratory needs to set up to cover far-flung areas of Nagaland State.

Village and remote area populations should be reached through local Village committees to educate on the ill concept and social dogmas on pre and post-pandemic circumstances.

Hopefully, under the combined efforts of the Nagaland Government along with the central assistant, Nagaland, and its neighboring states will surely win the battle against COVID-19 in the near future.

5. Limitations of the study: Due to the limitation in the representativeness of the sample, more studies are desired to investigate the KAP towards COVID-19 in different parts of the country and residents of low socioeconomic status among

residents of Nagaland and its neighboring states until a valid vaccine or medicine is available.

6. Expressions of gratitude: The author wishes to extend sincere gratitude to all the participants who participated in this online survey voluntarily and spontaneously.

7. Ethical approval: Since this study is conducted online based on voluntary participation in the survey, there is no ethical consideration associated with it. Moreover in the document, the identity of any individual or group has not been disclosed and does not come under any environmental or ecological system restrictions.

8. Conflict of interests: The authors declare that the investigation was carried out in the absence of commercial or financial benefits or any other which goes against conflict of interest.

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