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Knowledge, Risk Perception, and Preventive Measures of COVID-19 among Medical and Nursing students in Samoa: A Cross-Sectional Analysis

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ABSTRACT

Objectives: There has been unprecedented spread and re-evolving of the SARS-COV-2 throughout the world with the emergence of new strains of the virus. This study investigated the knowledge, risk perception and preventive measures of COVID-19 among Medical and Nursing Students in Samoa.

Methods: This is a cross-sectional study conducted from August to October 2020 at the National University of Samoa (NUS). The study was conducted using an online self-administered questionnaire, which was distributed on specific social media and interactive online platforms such as Facebook, WhatsApp and Moodle groups of Medical and Nursing students. A total of 75 students participated in this study.

Results: About 88% of the study subjects were knowledgeable about COVID-19 and majority of them were females. 71% of the students were aware of early diagnosis of COVID-19. There was also a significant level ($p=0.003$) of association of COVID-19 in persons with underlying conditions and students' academic levels, depicting that a greater percentage (92%) of the participants' perceived adults above age 65 and individuals in the high-risk groups (diabetic, hypertensive and cancer patients) were more prone to COVID-19. Most of the students (95%) stated that observing basic safety precautions; sneezing and coughing into the elbow (86%), regular hand washing with soap and water (89%), observing personal hygiene and social distancing (84%) and frequent use of hand sanitizers (76%), could prevent the contraction of COVID-19.

Conclusion: Our findings suggested that medical and nursing students, who are future frontline healthcare workers in Samoa, showed a considerable level of knowledge, risk perception and preventive behaviour towards COVID-19. Additionally, updating the students' knowledge about the diagnosis and case management of COVID-19 is imperative when implementing proper preventive strategies to curtail the spread of the disease.

Key words: COVID-19; knowledge; Risk perception; preventive behaviour; Students; Samoa

INTRODUCTION

Human Coronaviruses are a large group of viruses that are rather common throughout the community. Coronaviruses (CoVs) belong to the order *Nidovirales* of the family *Coronaviridae*, which are positive-sense single stranded non-segmented RNA viruses. CoVs are divided based on their antigenicity into four groups: alpha-, beta-, gamma-, and delta CoVs.^{1, 2} Alpha- and beta-CoVs infect humans and cause a wide variety of clinical sequelae ranging from common cold to croup, bronchiolitis, and pneumonia.^{3, 4} Some CoVs, which were considered enzootic infections, have jumped across animal-human

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species barrier to become a zoonotic infection affecting humans. CoVs, such as the Severe Acute Respiratory Syndrome (SARS) and the Middle East Respiratory Syndrome (MERS), caused by SARS-CoV and MERS-CoV, consecutively, led to virulent infections in humans.^{5, 6}

The year 2019 ended with a global panic in the form of an outbreak of a new strain of coronavirus called the Severe Acute Respiratory Syndrome Coronavirus Type 2 (SARS-CoV-2). On February 11, 2020, the World Health Organization (WHO) designated a new name for the epidemic disease caused by this virus – coronavirus disease 2019 (COVID-19). Evidence has shown that the virus for COVID-19 is transmitted through birds and mammals, with humans being particularly vulnerable to infection and transmission of the virus.⁷ Epidemiological investigations have shown the incubation period of the SARS-CoV-2 to be between 1-14 days and the virus has also been found to be contagious in the asymptomatic patients.⁸ Infection with COVID-19 is more prominent in the elderly people with underlying diseases^{9, 10}, where it clinically manifest in form of fever, cough, malaise and acute respiratory distress syndrome occurring in few patients which may eventually leads to death. However, in adults and children the disease is usually presented with mild flu-like illness.¹¹ The overall mortality rate of COVID-19 is 2% which is much lower than that of the Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS). Increased respiratory transmission of the disease necessitates the practice of strict respiratory precautions for its prevention.¹² Medical staffs that are front liners are at increased risk of this contagious disease. Knowing that COVID-19 can probably be transmitted from non-symptomatic individuals, poses a multiplied risk of significant momentum.^{13, 14, 15} This was elucidated in a study in Wuhan City by Wang *et al.* which reported transmission of SARS-CoV-2 to health professionals including medical students.¹⁶ Chang *et al.* also indicated that a patient, who was scheduled to undergo surgery, had infected 14 health care workers even before the onset of symptoms.¹⁷

In addition, several studies have emerged assessing the virologic features and clinical effects of COVID-19;^{18, 19} however, not enough studies have been carried out to focus on the understanding of knowledge, risk awareness and preventive behaviours for COVID-19 among health science students, who may become frontline healthcare workers, especially in the Pacific Island Countries and Territories (PICTs). In addition, knowledge is a prerequisite for establishing preventive beliefs, promoting positive attitudes and behaviours. Individuals' cognition, risk perception and preventive attitudes towards disease affect the effectiveness of their coping strategies and behaviours to a certain extent.¹³ In case of the current pandemic, the knowledge and behaviour assessment of the public towards the disease is essential, especially due to the large amount of misconceptions and false information that are circulating on social media in regard to transmission of the disease and methods of acquisition.²⁰ This is of importance to healthcare professionals, service providers, medical and nursing students in preparing and providing quality care during pandemic events. Such assessments have proven useful as an important means in the education and raising awareness of best practice in previous viral outbreaks including SARS, MERS, and Ebola.^{21, 22, 23}

In resource-limited settings, medical and nursing students may be the first individuals who have close contact with affected persons. Lack of proper related knowledge in this group can make them overestimate the situation, increase their stress and anxiety level and may interrupt the appropriateness of their medical judgments.²⁴ Due to the tourism and conservative culture of Samoa, it is highly susceptible to an outbreak of COVID-19 if strict public health regulations and prevention measures are not enforced.²⁵ Up until now, no similar study on this topic has been carried out in Samoa, being among the last few COVID-19 free countries worldwide.

METHODS

Study Design and location

This was a quantitative cross-sectional study conducted from August to October 2020 at the NUS. The University's students' population is about 4,000 with a staff capacity of about 380. The participants included in this study were from the Faculty of Health Sciences including medical and nursing students, who could be potentially first responders to any future pandemic or disease outbreak in the country.

Demography of Samoa

Samoa, a Polynesian Island country in the Pacific Ocean consists of two main islands, which are Savai'i and Upolu. There are also two smaller inhabited islands, Manono and Apolima, and several small uninhabited islands including the Aleipata Islands (Nu'utele, Nu'ulua, Fanuatapu and Namua) (Fig 1). The capital city of Samoa is Apia. According to the World Bank population statistics in 2019, the population of Samoa was 197, 097 with males being 101, 781 and females 95, 316.²⁶

Samoa's health system is made up of the public and private health sector. Primary and secondary healthcare are mainly based in the community and district hospitals, while the tertiary healthcare is provided in the referral-based hospital in Apia and overseas treatment scheme (New Zealand and India).²

Figure 1: Map of Samoa showing the different regions and districts

[Source:

<https://www.pinterest.com/pin/478226054154274446/>]



METHODS

The study was conducted using Google form, an online self-administered questionnaire, which was distributed to specific social media and interactive online platforms such as Facebook, WhatsApp and Moodle groups of medical and nursing students.

Inclusion criteria

- Medical and nursing undergraduates

- any gender
- any nationality
- living in Samoa
- able to read and write
- has a Facebook, WhatsApp and Moodle account
- member of social media groups that were selected for the study

Exclusion criteria

- Not in the Faculty of Health sciences
- participants less than 18 years
- does not live in Samoa

Survey questionnaire

This was composed of an interface, which included three main items with a total number of forty-one questions. The questionnaire explained the aims and objectives of the study and informed consent statement was included to assure the participants of confidentiality. The questionnaire was structured in English and formatted into the Google forms, internet-based software, commonly used for data collection via personalized survey. It was preferred for its convenience, efficiency and high popularity, especially in the current scenario, where most

educational institutions of the country were observing online teachings for students due to the imminent threat of COVID-19 and lock down situations. After questions were added into Google forms, a link for the same was generated and randomly distributed to the participants' social media groups.

The four main items in the questionnaire included:

Socio-demographic data such as gender, age group, academic level, residential village, religion, marital status, nationality,

department and employment status.

Questions on knowledge included data on most important symptoms of COVID-19, level of awareness on diagnosis, knowledge on treatment and management of COVID-19 and geographical views on socio-biological factors of COVID-19.

Questions on risk perception included entities such as history of respiratory associated problems, perception about high risk groups

(diabetes, hypertension, and cancer patient) and emotional states after diagnosis etc.

Questions on preventive measures included participants' behaviour towards acquisition of the infection such as hand washing, use of hand sanitizers, sneezing and coughing into the elbow, healthy eating, self-isolation, etc.

Data collection

The questionnaire link was distributed through social media groups. Thereafter, members who clicked on the link were directed to complete the survey. To reduce any missing information, the participants were requested to answer all questions.

Sample size calculation and Data analysis

The estimated sample size (n) was calculated using Kish formula²⁸ for sample size estimation at a 95% significance level and a margin of error below 5%. For this study, the representative sample size was 75. All captured data from the online survey were entered into Microsoft Excel and then imported into the Statistical Package for Social Sciences (SPSS) version 25. Data were analysed and the level of association was determined using the Chi-square test method. The categorical variables with their percentage frequencies were computed. The mean and standard deviation for the age groups were also analysed.

RESULTS

A total of 75 medical and nursing students responded to the survey questionnaire. The mean age was 24.7 years with the larger percentage (%) of participants falling between the age groups of 18 to 25 years. Among the participants, 20 (26.7%) were males and 55(73.3%) were females (**Table 1**). The majority of the participants were also females undergoing their bachelor's degree programs in the nursing and medicine departments. 40 (53.3%) of the female participants were employed and were involved in COVID-19 work-related trainings and awareness programs.

COVID-19 knowledge

The majority (88%) of the participants had heard about COVID-19 through social media. There is a high level (71%) of awareness on early diagnosis of COVID-19 among the participant (**Table 2**). When asked about symptoms of COVID-19, most of the students (85%) agreed that dry cough was a symptom of the disease. In contrast, a high number of the students (85%) stated that COVID-19 could not be treated. In addition, half of the participants agreed death could occur if COVID-19 was not well managed. Around 77% of the

participants agreed on the effect of environmental factor (heat) in reducing the transmission of COVID-19, while 16% of the students thought otherwise. Study participants also differed in their knowledge of the effect of biological and geographical factors (56%), (32%) and (12%) on COVID-19. Based on the religious knowledge, a lower percentage (12%) of the participants agreed COVID-19 was a punishment from God.

Table 1: Demographic characteristics

Gender		
Characteristics	% (n =20) Males	% (n= 55) Females
Age group		
18 to 25 years	25.3 (19)	57.3 (43)
26 to 35 years	2.7 (2)	13.3 (10)
36-45 years	--	8.0 (6)
> 45 years	--	1.3 (1)
Academic level		
Foundation	1.3 (1)	--
Diploma	--	1.3 (1)
Bachelor	25.3 (19)	60.0 (45)
Postgraduate	--	9.3 (7)
Residential village		
Urban	22.7 (17)	29.3 (22)
Rural	2.7 (2)	40.0 (30)
Religion		
Christianity	26.7 (20)	70.7 (53)
Others	1.3 (1)	2.7 (2)
Marital status		
Single	25.3 (19)	52.0 (39)
Married	--	18.7 (14)
Others	--	1.3 (1)
Nationality		
Samoan	24.0 (18)	68.0 (51)
Others	--	5.3 (4)
Department		
Medicine	6.7 (5)	8.0 (6)
Nursing	18.7 (14)	64.0 (48)
Employment		
Employed	4.0 (3)	53.3 (40)
Not employed	20.0 (15)	34.7 (26)

Table 2: Levels of COVID-19 Knowledge, risk perception and preventive behaviour

Level of Knowledge	Correct response Rate (%) Range 0 – 100%		
Items	Yes	No	Maybe
Where did you hear about covid-19? <ul style="list-style-type: none"> • Social media 66 (88%) • Friend 1 (1.3%) • University press 5(6.7%) • Family member 3(4%) 			
Is early diagnosis possible?	71	26	3
Is coronavirus another name for covid-19?	65	23	12
Are you familiar with covid-19?	72	9	19
Dry cough is a symptom of covid19	85	15	0
Covid19 leads to death if not managed properly	49	16	35
Covid-19 can be treated	0	85	15
Covid19 is a disease that affects only the wealthy	73	24	3
Covid19 can be killed in hot environment	77	16	7
Covid19 does not respect geographical boundaries, ethnicity, age, religion and gender	56	32	12
Covid19 is a punishment from God for the sin of man	12	74	14
Level of Risk Perception			
Items	Yes	No	Maybe
Stress and genetic factors can be responsible for covid19	22	40	38
Covid19 affect more men compared to women	85	3	12
The elderly (>60yrs) are more susceptible to covid19 than young adults	72	28	0
Covid19 can make the victim feel isolated and different from the rest of the world	96	0	4
Individuals who have respiratory tract infections diabetes, hypertension cancer are more at getting risk of getting covid-19	92	5	3
Covid19 can cause feelings of sadness, worry scare and anger	77	14	9
Practicing preventive behaviours			
Items	Yes	No	Maybe
Avoid touching eyes, nose and ears to prevent covid19	93	7	0
Sneezing and coughing into the elbow can prevent covid19	86	0	14
Can covid-19 spread from person to person by direct contact	95	4	1
Washing hands frequently with soap and water can help to prevent a person from getting covid19	89	8	3
Avoid touching eyes, nose and ears to prevent covid19	93	7	0
Sneezing and coughing into the elbow can prevent covid19	84	0	16
Using hand sanitizer frequently can prevent covid19	76	15	9
Staying safe by visiting loved ones can prevent an individual from getting covid19	72	11	17
Going to the hospital if you are feeling feverish may save you from covid19	84	0	16
Observing personal hygiene and social distancing can prevent covid19	84	5	11
Eating a lot of veggies and fruits can increase your immunity against covid19	80	4	16
Isolating yourself for 2 weeks if you make contact with someone who has tested positive to covid-19 can help in preventing disease contraction	85	3	12

COVID-19 risk perception

Regarding the level of risk perception, 72% of the interviewees agreed that the elderly (> 60years) were more susceptible to COVID-19 and interestingly 85% of study participants indicated that coronavirus disease would have a greater effect on men compared to women. Perception about high risk groups (diabetes, hypertension and cancer patient) showed that a larger percentage (92%) of students thought that people with underlying conditions were more prone to contracting the disease. Furthermore, participants were indifferent about their perception on stress and genetic factors as being responsible for COVID-19 (Yes 22%, No 40%, Maybe 38%). Moreover, a high percentage of the subjects agreed that COVID-19 could result in feelings of isolation (96%), sadness, worry, scare and anger (77%).

COVID-19 preventive behaviour

While asked about preventive behaviours toward COVID-19, participants shared their agreement on avoiding touching of eyes, nose and ears (93%), sneezing and coughing into the elbow (86%), frequent washing of hands with soap and water (89%), observing personal hygiene and social distancing (84%) and frequent use of hand sanitizers (76%). Additionally, 95% of the interviewees stated by avoiding direct person-to-person contact could reduce the spread of COVID-19, 85% of study subjects agreed that personal isolation for 2 weeks could prevent coronavirus contraction if there was a contact with a confirmed or suspected COVID-19 case. Likewise, 80% of the participants agreed that eating more veggies and fruits could boost personal immunity against coronavirus disease and 84% participants stated that by visiting hospitals if unwell could save a person from COVID-19.

Association between level of knowledge, risk perception and preventive behaviour of COVID-19 among medical and nursing students in Samoa

We tested the association of students' COVID-19 knowledge, risk perception and preventive behaviour against major variables including age, gender, department, residential village, family status and academic level. There was a significant association between the students' knowledge about COVID-19 and their family status ($p=0.001^*$). There was also a significant association between the students' academic levels and their risk perception, especially having an underlying disease condition in contracting COVID-19 ($p=0.003^*$). Similarly, a significant relationship

existed between preventive behaviour and students' academic level ($p=0.039^*$). The present study thus concludes that significant associations exist among the tested variables and students' level of knowledge, risk perception and preventive behaviour.

DISCUSSION

The imminent threat of COVID-19 to the survival of the global socio-economic space has continued to re-emerge, despite tremendous efforts and contributions by various government stakeholders. With ongoing possibility of vaccine containment measures, much is still needed to be done regarding inter and intra communities spread of the SARS-CoV-2. This could result in concerted collaborations and partnership amongst regional stakeholders in the Pacific Island Countries and Territories (PICTs) in keeping the coronavirus disease at bay through border control measures. There was great concern in Samoa of a positive case of COVID-19, which generated panic among the public and stigmatization of suspected cases of the disease due to the people's peculiar cultural beliefs and traditional way of living.⁴³ Additionally, significant fear of the impact of a vaccine preventable disease on an under vaccinated Samoan population was the result of a horrific recent measles experience, where 81 deaths and 5,675 cases of measles were reported from the epidemic in 2019.²⁹ However, to forestall a COVID-19 epidemic in Samoa, a great deal of awareness and prevention measures is imperative for healthcare professionals including student doctors and nurses, who are future frontline health workers. Hence, it is important to assess their knowledge about COVID and its causative agent, understanding their opinions on the risk factors and their preventive measures.

In this cross-sectional analytical study, we explored the knowledge, preventive behaviour and risk perception of nursing and medical students towards COVID-19 in Samoa. Based on our search, no current study on this topic among students had been carried out in Samoa or neighbouring Pacific island nations. In April 2020, there was a surge in COVID-19 cases in New Zealand²⁵, hence, as a preparedness approach; we carried out this study to assess the level of awareness of medical and nursing students, since some of these students are currently working in the hospitals and community health centres, and are at high risk of infection transmission.

Table 3: Association between level of knowledge, risk perception and preventive behavior of COVID-19 among medical and nursing students in Samoa

	Age	gender	department	residential village	family status	academic Level
Level of knowledge						
1. COVID-19 can be treated.	x ² 10.450 p 0.577	x ² 1.904 p 0.753	x ² 8.182 p 0.085	x ² 1.815 p 0.770	x ² 12.279 p 0.139	x ² 15.181 p 0.232
2. COVID19 does not respect geographical boundaries, ethnicity, age, religion and gender	x ² 14.073 p 0.296	x ² 3.573 p 0.467	x ² 3.291 p 0.510	x ² 6.109 p 0.191	x ² 27.100 *p 0.001	x ² 10.976 p 0.531
3. COVID19 can be killed in hot environment	x ² 2.407 p 0.983	x ² 1.099 p 0.777	x ² 2.024 p 0.567	x ² 2.024 p 0.567	x ² 2.450 p 0.484	x ² 6.368 p 0.703
Risk perception						
1. COVID19 is a punishment from God for the sin of man	x ² 17.429 p 0.134	x ² 5.232 p 0.264	x ² 10.177 *p 0.029	x ² 2.578 p 0.631	x ² 4.782 p 0.439	x ² 28.729 p 0.004
2. Individuals who have respiratory tract infections, diabetes, hypertension, cancer are more at risk of getting COVID-19.	x ² 4.198 p 0.898	x ² 2.596 p 0.458	x ² 1.413 p 0.703	x ² 4.198 p 0.241	x ² 3.259 p 0.776	x ² 6.984 *p 0.003
Preventive behavior						
1. Washing hands frequently with soap and water can help to prevent a person from getting COVID-19.	x ² 13.166 p 0.155	x ² 1.854 p 0.603	x ² 2.644 p 0.450	x ² 5.641 p 0.130	x ² 13.904 p 0.126	x ² 13.166 p 0.135
2. Sneezing and coughing into the elbow can prevent COVID-19.	x ² 8.032 p 0.236	x ² 2.677 p 0.262	x ² 4.835 p 0.089	x ² 1.932 p 0.748	x ² 5.676 p 0.460	x ² 3.910 p 0.110
3. Using hand sanitizer frequently can prevent covid19	x ² 13.926 p 0.731	x ² 7.924 p 0.244	x ² 3.233 p 0.779	x ² 19.952 p 0.068	x ² 14.845 p 0.900	x ² 5.341 *p 0.039

Key: x²= chi square value. P= p-value, *p-value < 0.05 is Significant

About 85% of participants had high level of knowledge related to COVID-19. The reason for this may be due to their access to available information from several media and literature. It is evident from this high response rate that the majority of students were aware of the early diagnosis and common symptoms of COVID-19. These findings acquiesces with previous studies, where there were high overall knowledge scores (60-98.7%) among medical and non-medical students towards coronavirus disease in Nepal²⁹,

74.5% among medical and nursing students in Egypt³⁰, 67.9% among health science students in Thailand,³¹ 90% among Chinese medical students³² and 79.6% among Iranian Medical students.³³ In contrast, 85% of participants were unaware about the availability treatment for COVID-19. This finding agreed with a study by Alzoubi *et al*¹². which reported that 80% of the participants identified that there was unavailability of vaccines and treatment for COVID-19. This may be as a result of little

information on therapeutic interventions. It could be suggested that current Food and Drug Administration (FDA) approved treatment modalities for COVID-19 under emergency use authorization need to be made available through Public Health social media platforms in Samoa. This would aid easy access to medical and nursing students.

In preparation for future pandemics, knowledge about epidemiologic triads for certain infectious diseases could also be published in Notifiable Disease Registry (NDR) and be accessible for students through the Samoa Public Health Department. Additionally, the Samoan government through its Ministry of Health is constantly promoting campaigns on epidemic preparedness via leveraging on available resources, capacity building; use of personal protective equipment (PPE) such as face masks and hand gloves; appropriate identification of isolation and quarantine facilities and strengthening communications to raise public awareness and counter rumours and misinformation.²⁵

This study also reported high scores of risk perception, among elderly being more susceptible to coronavirus disease (72%). About 92% of students also identified that individuals having underlying conditions such as hypertension, cancer and diabetes were more vulnerable to contract COVID-19, owing to the fact that the PICTs including Samoa suffers from alarming rates of non-communicable diseases (NCDs)³⁴. Majority (87%) of the participants in our study also opined that COVID-19 could result in emotional and psychological distress. These findings could be related to the incessant and stringent lockdown measures in neighbouring countries and feelings of being isolated from families and other members of the public once someone is infected with the disease.

There was a significant association between academic level of participants and preventive behaviours, ($p= 0.039$) but no significant association existed with other variables such as age, gender, department and family status. Most participants identified preventative measures towards the spread of COVID-19, such as avoiding direct person-to person contact (95%), frequent hand washing with soap and water (89%), regular use of hand sanitizers, having proper respiratory etiquettes (86%) and avoid touching facial orifices (93%). Similar outcomes were reported by Elhadi *et al*, where a high overall preventive behavioural score of 92.87% among medical students suggested that transmission of SARS-CoV-2 could be controlled successfully.³⁵ Outcomes of the current study are

consistent with other previous studies, which showed that frontline healthcare workers had a high level of positive attitude towards prevention of COVID-19.^{36, 37, 38}

Since findings of this study revealed an association between students' academic level with risk perception and preventive behaviour, this may imply a positive relationship among these factors. Yang *et al* revealed that an increase in risk perception led most students to adopt greater compliance with preventive practices, and suggested that the students who most feared the virus would most likely protect themselves.³⁹ Furthermore, a significant percentage (88%) of the students in this study had heard about COVID-19 through social media. This indicated the effect of social media on their attitudes towards preventing the disease. It also demonstrates that fear could mediate the relationship between social media exposure, individual risk perception, and preventive behaviours. This may suggest that social media exposure during an infectious disease outbreak could elicit self-relevant emotions and thus, increase individual risk perception and preventive behaviours⁴⁰.

Optimal nutrition and dietary nutrient intake could impact the immune system through gene expression, cell activation, and signalling molecules modification,⁴² thereby promoting overall personal immunity. The nutritional statuses of individuals have been used as a measure of resilience towards a decline in health status.⁴¹ This falls in tandem with our findings, where a larger percentage (80%) of the participants perceived that eating more veggies and fruits could boost immunity against coronavirus disease. About 84% of the students also perceived that individuals with underlying health conditions were more at risk of getting the virus. Therefore, it could be recommended that proper nutrition and healthy lifestyle could reduce the likelihood of being susceptible to COVID-19 and the possibility of an early recovery.

Limitations

This current study had some constraints. Firstly, due to the lockdown in the country, only online Google forms were used as the main means of data collection. Participation in this study could have been improved if additional data collection tools such as hard copy questionnaires were used. Secondly, our study only focused on medical and nursing students, which might have resulted in a selection bias.

Therefore, general views from other university students were not covered in this study. Lastly, in the questionnaire, the use of facemasks as a preventive measure was not included. However, as a health and safety precaution, face masks are currently recommended by the WHO globally in reducing the spread of SARS-CoV-2.

CONCLUSION

Our study has shown that there is significant level of knowledge, risk perception and preventive behaviour among medical and nursing students in Samoa towards the COVID-19 outbreak. However, it is pertinent for students and health professionals to choose wisely, when getting information from social media, and only use evidence-based public health websites. More emphasis should be put on updating the students' knowledge regarding the diagnosis and case management of COVID-19. Educational interventions for Samoa and PICTs should be tailored to include communities and healthcare workers, via accessible media and social networks.

Campaigns on healthy lifestyle programs should be promoted along with more COVID-19 awareness including health and safety practices. More studies should be conducted to look at the perceived levels of knowledge, attitude and risk of COVID-19 among frontline workers such as health professionals and hospitality personnel, who often are in close proximity to isolation and quarantine facilities. These could assist in decision making processes and coping strategies in preparing for future pandemics.

Abbreviations:

- **COVID-19:** Coronavirus disease 2019
- **CoVs:** Coronaviruses
- **FDA:** Food and drug administration
- **PICTs:** Pacific Island Countries and Territories
- **MERS:** Middle East respiratory syndrome virus
- **RT-PCR:** Reverse transcription polymerase chain reaction
- **SARS:** Severe acute respiratory syndrome
- **SARS-CoV-2:** Severe acute respiratory syndrome corona virus type 2

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Competing Interest

The authors declare that they have no competing interests.

Authors' contributions

LOO conceived the study and wrote the first draft together with JAA and VY. MSM supplied with useful resources. All authors made substantial contributions to the design, data acquisition, interpretation of data and tables, and took part in revising the manuscript for intellectual content. All the authors read and approved the final version to be published and are accountable for all aspects of the work.

Ethics Approval and Consent

The study was designed and conducted in accordance with the ethical principles established by the National University of Samoa Research Ethics Committee. Thus, ethical approval was obtained from the University Research and Ethics Committee.

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