Research Article

Factors influencing patients' willingness to test for COVID-19: a cross sectional study amongst non COVID-19 patients at the Teaching Hospital in Jaffna, Sri Lanka

Kalpana S[1], Suganthan N[1,2], Rajeshkannan N[4], Arasalingam A[1,2], Nalayini J[3]

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Abstract

Introduction: Sri Lanka adopted various control measures to stop the spread of COVID-19 including early detection by widespread testing, contact tracing and isolation. However, some people were not willing to accept testing due to several reasons. This is the first study from Sri Lanka conducted to determine people's level of willingness to undergo a COVID-19 swab test.

Method: This cross-sectional study was conducted among 427 non-COVID-19 patients who visited the outpatient department at a Teaching hospital in northern Sri Lanka. Data collection was done over a one month period in July 2021. The data collected was entered and analysed using SPSS version 28.

Results: The mean age of the participants was 43.4, and a majority of the participants were female (62.8%). A significant proportion of the participants (37.9% CI: 34.3-43.6) were not willing to accept the test to screen for COVID-19. Among the 162 patients who were not willing to accept the test, 56.2% reported fear regarding testing, and 37.6% reported fear of getting a positive result. A significant association was observed between people's willingness to accept the test and their gender (P-0.022) and knowledge of the test (P-0.001).

Conclusion: As a considerable proportion of participants were not willing to accept COVID-19 screen testing, and people's knowledge regarding testing significantly influenced their acceptance of such testing, this study concludes that the public can be educated further about the COVID-19 infection, identifying the symptoms of disease by themselves, available testing methods, the importance of testing early and how they will be treated if they get positive test results.

Keywords: *COVID-19 testing, Willingness to accept test, Sri Lanka, Stigma, Contact tracing*

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[1] *Teaching Hospital Jaffna, Sri Lanka*
[2] *Faculty of Medicine University of Jaffna, Sri Lanka*
[3] *Base Hospital, Tellipalai, Jaffna, Sri Lanka*
[4] *Civic Park Medical Centre4, NSW 2145 Australia*

Address for correspondence: Dr N Rajeshkannnan, Civic Park Medical Centre[4], NSW 2145 Australia

Telephone: +61410008811; email: rajeshprimarycare@gmail.com *https://orcid.org/0000-0001-9045-3369*

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Introduction

The COVID-19 disease is caused by the SARS-CoV-2 virus. The main mode of transmission is through respiratory droplets, and an infected person can spread the virus while coughing, sneezing or talking. The incubation period of COVID-19 is 2-14 days, with 80% of infected persons developing mild symptoms or being asymptomatic.[1] Since the first case was identified in Sri Lanka in January 2020, several preventive measures have been implemented, including early detection and isolation of cases by testing for COVID-19.[2] Studies showed that meticulous testing and a contact tracing system could prevent up to 80% of total transmission.[3] The success of the method depends on reducing the time between the onset of symptoms and testing, and isolating index cases within 48 hours or less is critical to reduce the viral reproductive number. [4]

Statistics related to COVID-19 testing in Sri Lanka reveal that around 20.51% of the population (205,134/1 million population) has been tested. This is far below the rate in developed countries such as the USA, the UK and our neighbouring country, India.[5] The low testing rate could be due to the reduced availability of testing facilities as a result of economic constraints in the country, or a reluctance of people to subject themselves to COVID-19 testing. The willingness of people experiencing symptoms of COVID-19 to participate in screening is an essential component of contact tracing efficacy. However, only a few studies in the world have examined the factors that influence people's willingness to test for COVID-19.[6-8]

A media report from Australia listed the intrusive nature of the test, ethnic and racial beliefs, fear of self-isolation in asymptomatic individuals and not wanting to spend their own leave for self-isolation as some of the factors that have a negative impact on the willingness of the general public to subject themselves to screening.[9] It was clear that stigmatisation around COVID-19 negatively impacted public health intervention, which included people avoiding being tested. Stigmatization was also made worse by misinformation in news media and social media.[10-13] This demonstrates that specific communication to prevent stigma is essential to improve the testing rate. However, there have been no studies to explore this aspect in Sri Lanka to date. Therefore, this study aims to identify the level of willingness among people to undergo COVID-19 screening tests and determine the reasons for people's reluctance to be screened.

Methods

This cross-sectional study was conducted among 427 patients attending outpatient clinics at the Teaching Hospital, Jaffna, which is the largest tertiary care centre in the Northern Province, with patients from all parts of northern Sri Lanka. Data collection was done over a one month period in July 2021. All adult patients attending outpatient clinics during the study period were included in the study. Patients who had already undergone COVID-19 testing/ self-isolation, those under 18 years of age, those who were mentally challenged or did not have the capacity to make a decision and those refusing consent were excluded.

The sample size was calculated based on the formula of estimating proportions. As no previous study has been conducted in Sri Lanka, 50% was taken as the assumed proportion (p) for willingness to undergo COVID-19 testing, as it ensures the maximum sample size. A non-response rate of 10% was assumed, and the sample size was inflated to 425. We estimated that approximately 3000 patients who met the inclusion criteria and gave their consent would attend

outpatient clinics during the study period. A representative systematic random sampling method was employed to recruit the participants. Patients were randomly numbered from 1 to 6, and every 6th patient was included. A self-administered questionnaire in Tamil was used, and assistance was provided if needed. Questionnaires were prepared by the investigators, and pretested and modified according to the responses before use. The data was entered and analysed using version 28 of IBM SPSS. Participants' willingness to undergo COVID-19 screening tests was initially assessed based on a Likert scale (0-10). Their responses were categorized as follows: least likely to accept a COVID-19 screening test (0-2), less likely to accept (3-4), neutral (5), likely to accept (6-7), and extremely likely to accept (8-10). Willingness to accept testing was also assessed through the following question: "If you are offered screening for COVID-19, will you accept?" Answers to the question were dichotomous in nature: "Yes" or "No" to facilitate analysis.

Descriptive statistics (percentages and measures of central tendency) were calculated to identify the sample characteristics, while the participants' characteristics and knowledge were also cross-tabulated with their willingness to undergo the COVID-19 test. The chi-square test was used to assess the significance of the findings in relation to expected results, and a value of $P \leq 0.05$ was considered as statistically significant. The backward logistic regression approach was used through bivariate analysis of identified variables such as gender (male/female), educational status, occupation (employed/unemployed), patients with grandchildren (has grandchildren/ no grandchildren) and knowledge of the patient (below median/above median). Gender, occupation and knowledge were the only variables retained in the final model of logistic regression. The classification table revealed that the correct prediction of the model was 67.2% and the "goodness of fit" was assessed based on the Omnibus Tests of Model Coefficient (chi-square 30.165, df -3 $P<0.001$) and Negelkerke R-Squared - 0.093).

Results

The characteristics of the 427 participants' backgrounds are summarised in Table 1**.** The mean age of the participants was 43.41+/-15.60 (median 43, Range 18-84). The majority of the participants belonged to the 31 to 50 years age group (40.5%), were female (62.8%) and had received secondary education (56.0%). Most belonged to the Hindu religion (74.2%), were married (78.9%), belonged to a nuclear family (64.9%) and were unemployed (57.8%). The majority had between 1 to 5 children (70.3%).

Participants' willingness to accept swab tests to screen for COVID-19 was assessed in two different ways. Figure 1 summarizes the results that were assessed based on the Likert scale (0-10). The median score for acceptance among the participants was 7 in the Likert scale, with responses ranging from a minimum score of 1 to a maximum score of 10. A high proportion of the participants (47.8%) responded that they were extremely likely to accept the test when it was offered, and another 6.8% stated that they were likely to accept the test. However, 35.4% reported that they were less likely to accept the test. When willingness to accept the screening test was assessed through another direct question, around 62.1% (95% CI: 57.4 - 66.6%) reported that they were happy to do the test, while 37.9% (95% CI: 34.3% - 43.6%) responded that they were not willing to do the test.

Table 1: Basic characteristics of the participants (n=427)

Variable	Categories	No	%
Age	18-30 years	109	25.5
	31-50 years	173	40.5
	51-64 years	96	22.5
	65 years and above	49	11.5
Sex	Male	159	37.2
	Female	268	62.8
Educational Status	Did not attend school	13	3
	Primary (up to grade 5)	66	15.5
	Secondary (up to O/Level)	239	56.0
	Tertiary (up to A/Level)	83	9.4
	Graduate and above	26	6.1
Marital Status	Single	82	19.2
	Married	337	78.9
	Widow/ widower	8	1.9
Religion	Hindu	317	74.2
	Buddhist	2	0.5
	Christian	102	23.9
	Muslim	6	1.4
Occupation	Government job (permanent)	31	7.3
	Private sector (confirmed and permanent)	49	11.5
	Casual worker (government or private)	3	0.7
	Self-employed	55	12.9
	Casual daily wage earner	42	9.8
	Unemployed	247	57.8
Family Type	Nuclear family	277	64.9
	Joint/ extended family	150	35.1
No. of Children	No children	111	26.0
	1-5 children	300	70.3
	Above 5 children	16	3.7
No. of grandchildren	No grandchildren	323	75.6
	1-5 grandchildren	76	17.8
	Above 5 grandchildren	28	6.6

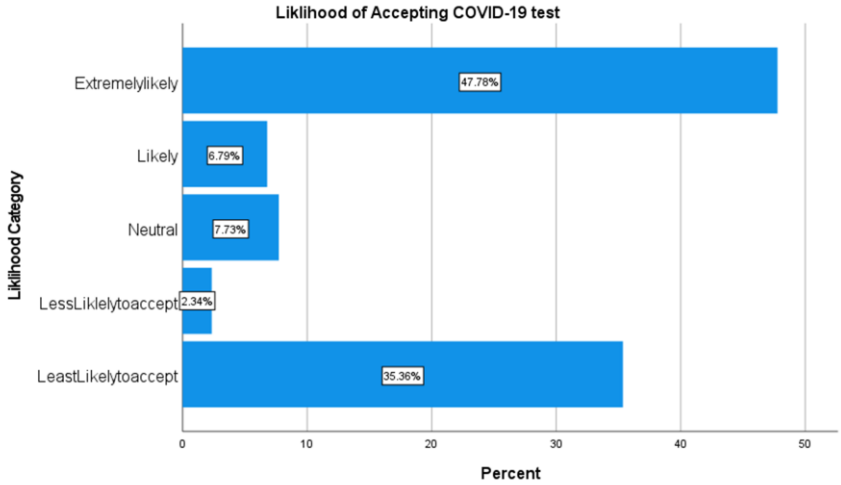

Figure 1: Likelihood of accepting a swab test that is offered to screen for COVID -19

The reasons given by participants who were not willing to accept the screening test (n-162) are summarised in Table 2. Around 56.2% reported fear or anxiety about having the test, and 37.6% reported fear of positive results. Fear of quarantine and separation from family members was reported by 35.2%. Importantly, 56.8% reported inadequate knowledge about the testing procedure, and 29.6% were concerned about the stigma related to positive results.

Table 2: Common reasons given by patients who were not willing to accept the COVID-19 PCR test (N-162)

Reasons	No	%
Factors affecting the reluctance to subject themselves to the test		
Anxiety regarding a positive test result	61	37.65
Anxiety regarding the procedure/ fear of having a procedure/ test	91	56.17
Inadequate knowledge about the testing procedure	92	56.79
Others' experiences related to the test procedure	42	25.93
Fear of pain or after effects of the test	93	57.41
Factors related to a positive test result		
Fear of quarantine	57	35.18
Fear of self-isolation	56	34.57
Fear of the stigma associated with positive test results	48	29.63
Fear of being separated from the family	57	35.18
Fear that the family will also be quarantined	55	33.95
Fear that there will be no one to look after family members	53	32.72
Fear of having no one to look after the children	38	23.47
Fear of having to stay away from work	22	13.66
Fear of losing income	23	14.20
Fear that their children will have to miss out on school	22	13.66
Fear that their children will also have to be quarantined	35	21.60
Fear of losing their social life	56	34.57
Fear of being unable to communicate with others	7	4.32
Belief that he/she will not get COVID-19	5	3.09
Spiritual reasons	1	0.62

The participants who were willing to accept the test (n=265) did so based on their belief that early detection would help avoid complications (99.6%) and because they thought they had a social responsibility to reduce community spread (98.1%) as shown in Table 3.

Six questions were set out to assess the participant's knowledge regarding the COVID 19 swab test, as summarised in Table 4. Out of these questions, the median number of questions answered correctly by participants was 4 (minimum-0, maximum-6). The median number 4 was used to classify the participants as having adequate knowledge (≥4), or inadequate knowledge (<4) regarding the test. Analysis based on these categories showed that 38.9%

(95%CI: 34.3%-43.6%) had inadequate knowledge. A further 37.7% of the participants did not agree that this test is painless or causes very minimal discomfort.

Table 3: Common reasons given by patients who were willing to accept the COVID-19 PCR test (N-265)

Reasons		No	(%)
1.	Early detection will help to avoid complications	264	99.62
2.	Early detection will help to avoid complications	263	99.24
3.	Early detection ensures it will not progress to become a severe disease if adequate care is taken	264	99.62
4.	Isolating early will protect the other family members and prevent the disease from spreading	260	98.11
5.	Social responsibility to reduce the community spread	260	98.11
6.	Considering it as an opportunity to safeguard one's own community	259	97.74
7.	Testing is a selfless contribution to the community and the country	254	95.85
8.	A sense of satisfaction as a result of being responsible citizens who consider and prioritise vulnerable members of the community	256	96.60
9.	Prioritising community	258	97.36
10.	Good facilities at quarantine centres	31	11.70

Table 4: Participants' knowledge regarding the testing procedure (n=427)

Question	Yes		No		Does not know	
	N	%	N	%	N	%
COVID-19 is a contagious disease	357	83.6	16	3.7	54	12.6
COVID-19 is caused by the novel coronavirus named SARS-COV-2	61	14.3	9	2.1	357	83.6
The incubation period for disease is 2-14 days	310	72.6	1	0.2	116	27.2
COVID-19 spreads via respiratory droplets of infected individuals	354	82.9	5	1.2	68	15.9
Samples taken from the nose and throat can detect the disease before symptoms begin to show	320	74.9	4	0.9	103	24.1
This test is painless or it causes very minimal discomfort	161	37.7	88	20.6	178	41.7

The factors affecting people's willingness to accept the swab test used for screening COVID-19 are summarised in Table 5. Patients who displayed a sound knowledge of the COVID-19 screening test were more willing to accept the test (68.6%), compared to patients who had less knowledge (51.8%; P<0.001). People in the age group between 31-50, and 18-30 years were more willing to accept the screening test (66.5% & 65.1% respectively) compared to participants between 50-64 years (51.0%; P-0.077). Males were 1.8 times (95% CI: 1.09-2.98) more willing to accept a COVID-19 swab test compared to females. Educated participants, ranging from those who received secondary education (64.0%) and those who completed the Advanced Level (A/Level) examination (68.7%), to graduates (69.2%) signalled more willingness to accept the test compared to those who did not attend school (58.6%) and those who received only primary education (45.5%; P-0.031). Among the different occupational groups, those holding permanent jobs in the government sector (74.4%) and private sector (75.4%) were more willing to accept a screening test when it was offered (P-0.006), while those who were unemployed were less willing to accept the test (54.7%). Similarly, participants who did not have grandchildren were more willing to accept the test (65.9%), compared to those who had grandchildren (50.0%; P-0.014). Other variables such as marital status, religion,

family type and the number of children people had were not associated with their willingness to do undergo a screening test for COVID-19 (P>0.05).

Table 5: Socio demographic factors associated with people's willingness to do a screening test for COVID-19

Variable	Categories	Willingness to do the test				Statistics
		Yes		No		
		N	%	N	%	
Age	18-30 years	71	65.1	38	34.9	Chi-6.834 P-0.077
	31-50 years	115	66.5	58	33.5	
	51-64 years	49	51.0	47	49.0	
	65 years and above	30	61.2	19	38.8	
Sex	Male	118	74.2	41	25.8	Chi-15.891 P<0.001***
	Female	147	54.9	121	45.1	
Educational Status	Did not attend school	7	58.6	6	46.4	Chi-10.601 P-0.031*
	Primary (up to grade 5)	30	45.5	36	54.5	
	Secondary (up to O/Level)	153	64.0	86	36.0	
	Tertiary (up to A/Level)	57	68.7	26	31.3	
	Graduate and above	18	69.2	8	30.8	
Marital Status	Single	50	61.0	32	39.0	Chi-0.610 P-0.737
	Married	209	62.0	128	38.0	
	Widow/ widower	6	75.0	2	25.0	
Religion	Hindu	193	60.9	124	39.1	Chi-1,766 P-0.622
	Buddhist	2	100	0	0	
	Christian	66	64.7	36	35.3	
	Muslim	4	66.7	7	33.3	
Occupation	Government job (permanent)	24	74.4	7	22.6	Chi-16.291 P-0.006**
	Private sector (confirmed and permanent)	37	75.4	12	24.5	
	Casual worker (government or private)	2	66.7	1	33.3	
	Self- employed	41	74.5	14	25.5	
	Casual daily wage earner	26	61.5	16	m	
	Unemployed	135	54.7	112	45.3	
Family type	Nuclear family	175	63.2	102	36.8	Chi-0.417 P-0.518
	Joint/ extended family	90	60.0	60	40.0	
Number of children	No children	65	58.6	46	41.4	Chi-5.543 P-0.063
	1-5 children	194	64.7	106	35.3	
	Above 5 children	6	37.5	10	62.5	
Number of grandchildren	No grandchildren	213	65.9	110	34.1	Chi-8.494 P-0.014*
	1-5 grandchildren	38	50.0	38	50.0	
	Above 5 grandchildren	14	50.0	14	50.0	
Knowledge regarding test and infection	Below median	86	51.8	80	48.2	Chi-12.127, P<0.001**
	Above median	179	68.6	82	31.4	

Backward logistic regression analysis of variables such as gender, educational status, occupation, having grandchildren and patient's knowledge of the COVID-19 test – all of which were identified through bivariate analysis - demonstrated that the patient's knowledge (P-0.001) and gender (P-0.022) had a significant influence on his/her willingness to accept a

screening test for COVID-19 (Table 6), and the patient's occupation showed marginal significance (P-0.065).

Table 6: The variables in the final model of logistic regression

Variable	Co efficient (B)	Standard Error (SE)	P-value	OR with CI
Gender (Male)	0.588	0.257	0.022	1.80 (1.09-2.98)
Occupation (Unemployed)	-0.456	0.247	0.065	0.63 (0.39-1.028)
Knowledge (Above median)	0.667	0.209	0.001	1.95 (1.29-2.94)
Constant	-1.556	0.501	0.002	0.211
OR - Odds ratio; CI - Confidence Interval				

Discussion

COVID-19 caused significant morbidity and mortality worldwide since the beginning of 2020, and it is currently considered a major burden on public health. The World Health Organization (WHO) highlighted targeted testing to find cases as one of the recommended strategies to stop the spread of COVID-19. Preventive measures combined with early diagnosis, contact tracing and isolation remain some of the main strategies to prevent wide community spread of the SARS CoV-2 infection. [14]

Identifying the factors that influence people's willingness to accept screening tests for COVID-19, will provide real insight into testing strategies. The public could be motivated towards self-surveillance, which in turn would reduce and halt transmission. It is therefore important to understand the factors influencing people's willingness to test for COVID-19.[15] The WHO recommends that people practice "self-surveillance," whereby "individuals are asked to self-report if they have symptoms and/or if they have contact with a confirmed case," in addition to active case-finding.[14]

This study showed that slightly less than two thirds of the participants were willing to be tested for COVID-19. This proportion is high compared to an international research study conducted in Somalia, in which only 6.6 % of the participants who experienced clinical symptoms of COVID-19 voluntarily tested their COVID-19 status.[16] However, a significant proportion of patients in this study {37.9**%** (95% CI: 34.3%-43.6%)} were also not willing to accept the screening test.

Willingness to be tested was associated with some demographic variables, such as gender, educational status, type of job and the number of grandchildren (P<0.05). However, age, marital status, religion, family type and the number of children were not significantly associated with people's willingness to be tested (P>0.05). Analysis of the findings of this study confirmed that patients' knowledge regarding the COVID-19 swab test significantly influenced their willingness to accept the test (P-0.001). A study conducted in the UK showed that one's willingness to be tested for COVID-19 was not related to key socio-demographic factors.[15] In contrast to the UK, this study has revealed that knowledge about the disease, COVID-19 testing and the consequences of a positive test result varied greatly in Sri Lanka based on some demographic factors. This is probably because the demographic factors that were identified have led to inequality in access to information. Furthermore, the UK study showed that knowledge about how one contracts the virus and its impact on the patient and his/her family is strongly influenced by people's perceptions of the coronavirus. In contrast, our study revealed that one's family type - whether, nuclear or extended family – was not associated with

one's willingness to test for COVID-19 (P-0.518). A study in New York City showed that COVID-19 testing was not carried out among those who needed it due to existing socioeconomic and racial disparities and it confirmed the influence of these factors on people's access to testing.[17] However, our study does not assess these factors.

Though a large proportion of patients who participated in this study were unemployed (57.8%), the number of those among them who were willing to be tested was only slightly higher than those unwilling to be tested (54.7%, and 45.3% respectively). In contrast, among participants from varying occupations, the number of those who were willing to be tested was significantly higher (2 to 3 times) than those unwilling to be tested. A likely explanation for this could be the low educational level of the unemployed people compared to those who were employed, irrespective of their job. The educational level of the participants could have influenced their knowledge of COVID-19 and the testing procedure. These findings are very different to the results of a study conducted in Nigeria, where a large proportion of persons with low monthly incomes were willing to undergo the COVID-19 test.[18] One possible reason for the disparity in the present study could be that those with no permanent employment were less willing to be vaccinated due to their fear of losing their daily income.

According to our study, the main reason for people's willingness to be tested was their desire to get appropriate care through early detection, monitoring and treatment. Participants also believed that the disease could be prevented from spreading by early detection and isolation. In contrast, only around 11.7% of the participants mentioned good facilities in the quarantine centres as a reason for accepting the test. Similarly, a study conducted in Nigeria[18] showed that the main reason for respondents' willingness to accept the COVID-19 tests was to receive appropriate care. Our study also highlighted that almost 96-97% among those willing to be tested perceived it as part of their social responsibility as citizens. This shows that many of the patients did not want to compromise the health of other individuals by hesitating to be tested. Similar findings were observed in the Nigerian study as well.[18]

However, it should be noted that slightly over one-third of the patients were unwilling to be screened for COVID-19. Anxiety about the test, inadequate knowledge about testing and fears regarding positive results were the three most common reasons for this unwillingness. This study illustrates how the public perception regarding COVID-19 testing and procedures following positive test results negatively impact people's willingness to be tested. The findings show that other common reasons for unwillingness to be tested include a lack of knowledge about the method of testing, fear about the testing procedure and a perception that it is a painful procedure. This indicates that myths about testing that circulate in the public domain and poor knowledge about testing methods reduce people's willingness to be tested. This highlights the need for public education and improvements in testing methods including skilled testing staff. Targeted communications, specific local intervention by public health workers and using appropriate media to disseminate information are particularly effective in ensuring that the public gets tested for SARs-CoV2 when required.

This study also shows that fear of the person and his/her family being quarantined, fear of self-isolation, fear of separation from family, lack of support to look after the family and losing his/her social life were found to be the most common reasons to refuse or avoid testing. Interestingly, these reasons took precedence over the fear of losing a job, one's income or children's schooling in the event of a positive test result. Similarly, a survey conducted among travellers who were quarantined in hotels in Australia reported that 30% refused testing. The reasons for their refusal included wanting to avoid the consequences of positive test results,

fear about the test procedure and their dislike of being quarantined (as they did not want to live alone for 2 weeks).[19] This highlights the fact that by improving the quarantine centres' facilities (e.g. providing free facilities to communicate with family members via video while also ensuring their privacy) or allowing people to isolate at home with appropriate monitoring, the uptake of the test can be increased. The analysis of public health measures introduced to combat COVID -19 in Nigeria concluded that people's willingness towards testing and the uptake of testing could be further increased and sped up by sensitising and mobilising citizens to take responsibility.[20]

Finally, though a significant portion of the participants were not aware that the testing procedure for COVID-19 is painless or causes minimal discomfort, the majority knew that COVID-19 is a contagious disease, that it spreads via respiratory droplets, that its incubation period is between 2 to 14 days, and that the infection can be diagnosed even before symptoms appear by testing samples taken from the nose and throat.

Conclusion

This study's findings demonstrate that people's knowledge regarding the COVID-19 screening test significantly influences acceptance of testing, in addition to variants like gender and occupation. The public require more education about the COVID-19 infection, testing methods, the importance of testing early, as well as the consequences and procedures when they get positive test results. Educating the public will ultimately help them to practice self-surveillance if they developed symptoms suggestive of COVID-19. Furthermore, our findings indicate that improving the facilities in quarantine centres and implementing different self-isolation systems such as allowing home isolation when appropriate, will improve the acceptance rates among members of the public towards the screening test .

Declarations

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Conflict of Interest: The authors declare that this study was conducted in the absence of any personal or financial relationships and they have no conflict of interest.
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Ethics statement: Ethical approval for the study was received from the Ethical Review Committee, Postgraduate Institute of Medicine, University of Colombo (ERC/PGIM/2021/039).
All the participants were informed about the purpose of the study, and their consent was obtained before the commencement of the study. Participation in the study was voluntary, and the confidentiality of participants' data was ensured.
Authors' contributions: KS, NS, NR, NJ and AA conceived the study. KS & NS were involved in the data collection. NR conducted the analysis. KS, NR and NS wrote the manuscript. All the authors read and approved the manuscript.
Availability of data and materials: Available from the principal investigator or corresponding author on reasonable request.

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